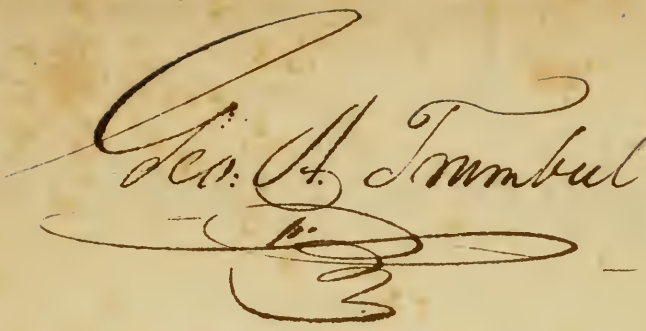

THE

MYSTERIES OF TRADE,

OR THE

GREAT SOURCE OF WEALTH:

CONTAINING

Receipts and Patents

IN

CHEMISTRY AND MANUFACTURING;

WITH

PRACTICAL OBSERVATIONS

ON THE USEFUL ARTS.

ORIGINAL AND COMPILED.

By DAVID BEMAN.

Give me the facts, said the noble Judge, Thy conclusions are but the guess work of Imagination which puzzle the brain and tend not to solve this mystery. OLD PLAY.

Boston:
PRINTED FOR THE AUTHOR,
BY WM. BELLAMY.
1825.

DISTRICT OF MASSACHUSETTS, *to wit :*

District Clerk's Office.

BE IT REMEMBERED, that on the twenty eighth day of December, A. D. 1824, in the forty ninth year of the Independence of the United States of America, DAVID BEMAN of the said District, has deposited in this Office the Title of a Book, the Right whereof he claims as Author, in the Words following, *to wit :*

"The Mysteries of Trade, or the Great Source of Wealth : containing Receipts and Patents in Chemistry and Manufacturing ; with practical observations on the useful arts. Original and Compiled. By David Beman.—Give me the facts, said the noble judge, Thy conclusions are but the guess work of Imagination, which puzzle the brain and tend not to solve this mystery.—*Old Play.*"

In Conformity to the Act of the Congress of the United States, entitled "An act for the encouragement of learning, by securing the copies of maps, charts and books, to the authors and proprietors of such copies, during the times therein mentioned :" and also to an act entitled "An act supplementary to an act, entitled, an act for the encouragement of learning, by securing the copies of maps, charts and books, to the authors and proprietors of such copies during the times therein mentioned ; and extending the benefits thereof to the arts of designing, engraving and etching historical, and other prints."

JNO. W. DAVIS,
Clerk of the District of Massachusetts.

PREFACE.

Aware that no work is more liable to *general* criticism, than one which affects to treat of the *modus operandi*, adopted in the several Arts and Manufactures dependant on Chemical Science; the Author, at the commencement, perceived that a strict adherence to the accounts and opinions, even, of the most approved Chemical writers, would be far from satisfactory to himself; and would, in some cases, prove delusive to his readers He likewise foresaw, that, although a general reader might, without farther inquiry, acknowledge or allow as true, every process and fact comprehended in the following pages;—some who should honour his labours by a perusal, might be more fastidious; and by calling in question the truth of a few particular facts, processes, or opinions; might be apt to pass sentence upon the whole. These considerations, conjoined with an ardent desire of becoming practically acquainted with several of the Chemical Arts, induced him, on many occasions, to seek for information, at its ultimately genuine source; viz. the work shop of the Artisan. The facts thus collected, and others already known, have been blended together: and the Author, in the belief that he has advanced nothing but what is strictly correct, trusts that as a whole, they will prove useful, not only to the Chemical Student, but also to the Manufacturer, and to the Economist.

Regarding the order of the work, he would say, that notwithstanding the elaborate researches, and ingenious speculations of many learned men in the several departments of Chemical Science; there are few so perfectly developed, as to admit of a systematic arrangement of the principles deduced from them: consequently any attempt at forming a system, where the foundation and other parts of the superstructure are incomplete, would prove abortive. It is for this reason that attempts to systematise Chemistry, have in every instance, been productive of failure.—In the present work, nothing further has been attempted, in the way of arrangement, than a generalisation of facts; and those facts, or Receipts, or Patents, as they are termed, are arranged either according to their Chemical relation, or according to their nature, and importance in the Arts.

Boston, *January*, 1825.

TO THE PUBLIC,

WHO ARE WELL QUALIFIED TO JUDGE OF MERIT OR DEMERIT.

On completing a work which is intended to present the most important results of the application of a science to the Useful Arts; and to shew to what extent it has contributed to the welfare and comfort of social life; I felt desirous of dedicating it to you, (in preference to any individual,) in whom the knowledge of judging most assuredly rests. And of the more refined productions of human intelligence.—Permit me to thank you for allowing me the liberty of thus assuring you of my most sincere esteem.

DAVID BEMAN.

Boston, January, 1825.

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VALUABLE RECEIPTS.

FERMENTATION AND DISTILLATION.

GENERAL OBSERVATIONS.

THE arts of fermentation and distillation have been practised from the most remote antiquity; they consist, in the first place, in the preparation of a vinous, or spiritous liquid, from farinaceous substances capable of being converted into saccharine matter, or sugar, and in the second, in separating the spirituous from the watery particles of the fermented liquor. Porter, Ale, Beer, and Wine are products of the former mode of operation; whilst Rum, Brandy, Whiskey, and Arrack are those of the latter. The existence of the latter, (which are all modifications of one substance, alcohol,) in the former, is the cause of that intoxicating, or exhilerating quality which is so peculiar to fermented liquors. The substances commonly in use, for the preparation of these liquors, are Sugar, Grapes and Barley; although there are various other substances used for the same purpose in many parts of the world.* The species of fer-

* The *sake* of the Chinese is prepared with rice; (the saccharine ingredient, or that which by fermentation, is productive of the alcohol;) the *chica* of the North Americans with *maize*; the *quass* of the Russians with a composition of barley, rye, and oats; the *koumiss* of the Tartars is composed of fermented mare's milk, and some aromatic substances, as angelica or the

mentation in question is generally denominated *vinous;* but there are two other kinds, viz.: the *acetous* and the *panary*, which being those which take place in the preparation of Vinegar and Wheaten Bread, shall be considered in order.

BREWING, OR THE PREPARATION OF FERMENTED LIQUORS.

Barley, which consists of fecula or starch, albumen and gluten, is the substance commonly employed for brewing ale, porter, and beer, in this country; but before these several liquors can be properly prepared, it is necessary that the ingredients should undergo some previous operations.

heracleum. The Swedes make a sort of beer of various fruits and grains, fermented together, as juniper-berries, plums, mulberries, cherries, gooseberries, &c. The art of making beer appears to have originated in Egypt, and to have extended thence along the coast of Asia, to the northern parts of that quarter of the globe; and hence to the corresponding part of Europe with the Scythians. Beer is not now used in Egypt, nor on the greater part of the coasts of the Mediterranean, (although Mungo Park says the negroes prepare it, and in a way nearly similar to that generally adopted in Europe,) but it has to the present time continued a favorite drink with the northern nations of Europe. This liquor very readily produces intoxication, and these people have preserved enough of the disposition of their ancestors,—to whom Odin promised drunkenness as one of the joys of his paradise,—to like it on this account. Distillation from fermented substances produces liquors commonly called spirits, as a general appellative; various kinds of which are prepared by different nations, thus Brandy is obtained from grapes, Rum from the juice of the sugar cane, Arrack from rice, Whiskey from barley, oats, and several species of grain of the cereal kind, and this when flavoured by juniper-berries, is called Hollands, Geneva, or Gin; treated thus by cherries, it is *kirschen-wasser*. Various compounds, as Ratifie, Noyeau, Rosolia, &c. are made by flavouring malt spirit with kernels and other aromatics. Beers are also treated in a similar way, by adding spruce, (the resinous juice of various species of *pines*) and formerly they were much in use as medicines, amongst the lower classes of people in England, when various drugs and vegetables, as gentian, senna, aloes, rhubarb, horse-radish, scurvy-grass, wild carrot seeds, &c. have been macerated in them. The substances from which wine, cider, perry, and mead, are prepared, are too well known to require being here designated.

Malting, or the conversion of barley into malt, is the first process in the making of beer. The grain is put into a trough with water, to steep for about three days: it is then laid in heaps, to let the water drain from it, and it is afterwards turned over and laid in new heaps. In this state, the same process takes place as if the barley were sown in the ground. It begins to germinate, puts forth a shoot, and the fecula of the seed is converted into saccharine matter. When the length of the shoot is about two thirds of the length of the grain, this process of germination must be stopped, otherwise the sugar would be lost, nature intending it for the nourishment of the young plant. The malt is therefore spread out upon a floor, and frequently turned over, this cools it and dries up its moisture, without which the germination cannot proceed. When it is completely dried, in this manner, it is called *air-dried* malt, and is very little altered in colour. But when it is dried in kilns, it acquires a brownish colour, which is deeper in proportion to the heat applied; it is then called *kiln dried.* This malt is now coarsely ground in a mill.

Mashing is the next process. This is performed in a large circular wooden vessel, called the mash-tun, shallow in proportion to its extent, and furnished with a false bottom, pierced with small holes, and fixed a few inches above the real bottom. There are two side openings, in the interval between the real and false bottom: to one is fixed a pipe, for the purpose of conveying water into the tun; the other is for drawing the liquor out of it. The malt is to be strewed over the false bottom of the tun, and then,

by means of the side pipe, a proper quantity of hot water is introduced from a copper; the water rises upwards through the malt, and when the whole quantity is introduced, the mashing begins; the object of which is, that the soluble parts may be extracted by it. For this purpose, the grist is sometimes incorporated with the water by iron rakes, and then the mass is beaten and agitated by long flat wooden poles, resembling oars, which are either worked by the hand, or by machinery.

When the mashing is completed, the tun is covered, to prevent the escape of the heat, and the whole is suffered to remain still, in order that the insoluble parts may separate from the liquor: the side is then opened, and the clear wort allowed to run off, (slowly at first, but more rapidly as it becomes fine,) into the copper or boiler placed below. The chief thing to be attended to in mashing, is the temperature, which depends on the heat of the water, and the state of the malt. If the water is let in upon the grist *boiling hot*, the starch which it contains will be dissolved and converted into a gelatinous substance, in which all the other parts of the malt and most of the water would be entangled beyond the possibility of being recovered by any after process. The most eligible temperature appears to be from 185° to 190° Farenheit; for the first mashing, the heat of the water must be somewhat below this temperature, and lower *in proportion to the dark colour of the malt* made use of. For pale malt, the water may be 180°, but for brown it ought not to be more than 170°. The wort of the first mashing is always the richest in saccharine matter, but to exhaust the malt, a second

and third mashing is required, in which the water may be safely raised to 190° or upwards.

The proportion of wort to be obtained from each bushel of malt depends entirely on the proposed strength of the liquor. It is said that 25 or 30 gallons of good table-beer may be taken from each bushel of malt. For ale and porter of the superior kinds, only the produce of the first mashing, or six or eight gallons is to be used. Brewers make use of an instrument called a saccharometer, to ascertain the strength and goodness of the wort. This instrument is a kind of hydrometer; and shews the specific gravity of the wort, rather than the exact quantity of saccharine matter which it contains.

The next process is Boiling and Hopping. If only one kind of liquor is made, the produce of the three mashings is to be mixed together; but if ale and table-beer are required, the wort of the first, or first and second mashings is appropriated to the ale, and the remainder is set aside for the beer.

All the wort destined for the same liquor, is transferred from the tun to the copper, and mixed with a certain proportion of hops. The better the wort, the more hops are required.

In private families, a pound of hops is generally used to every bushel of malt; but in public breweries, a much smaller proportion is deemed sufficient. When ale and table-beer are brewed from the same malt, the usual practice is to put the whole quantity of hops in the ale wort, which having been boiled some time, are to be transferred to the beer-wort, and with it to be boiled again.

The whole is now to be kept boiling as fast as possible, until, upon taking a little of the liquor out, it is found to be full of small flakes like those of curdled soap. The copper, in common breweries, is uncovered; but in those on a large scale it is fitted with a steam-tight cover, from the centre of which passes a pipe, terminating by several branches in the mash tun. The steam, therefore, produced by the boiling, instead of being wasted, is let into the cold water, and thus raises it to the temperature required for mashing; besides impregnating it very sensibly with the essential oil of the hops.

When the liquor is boiled, it is to be discharged into a number of coolers, or shallow tubs, where it remains until it becomes sufficiently cool to be submitted to fermentation. The process of cooling should be carried on as expeditiously as possible, particularly in hot weather. Liquor made from pale malt, and which is intended for immediate drinking, need not be cooled lower than 75 or 80 degrees: of course this kind of beer may be brewed in the hottest weather; but beer brewed from brown malt, and intended to be kept, must be cooled to 65 or 70 degrees before it is fermented. Hence the Spring and Autumn have been deemed the most favourable seasons for brewing the best malt liquor.

In the Working, the liquor gradually loses its transparency: an intestine motion, accompanied with a slight hissing noise, takes place throughout the whole contents of the vessel, and carbonic acid gas is disengaged in the shape of small bubbles, which, when they arrive at the surface, burst. These bubbles are enveloped in thin films of glutinous matter,

which, by constant accumulation, form the froth, scum, or barm, on the surface. This froth is usually called yeast, and will cause fermentation in any other body of malt or saccharine liquor.

The last operations are Tunning and Barrelling. From the cooler the liquor is to be transferred into the *working* tun, and mixed with yeast, in the proportion of a gallon of yeast to four barrels of beer, in order to excite the vinous fermentation. In four or five hours the fermentation begins; and it requires from 18 to 48 hours, before the wort is fit to be put into the barrels. The fermented liquor may be fined by pouring into it a solution of isinglass, yolks of eggs, or gum-tragacanth; and it is then to be excluded from the air, by means of a tight bung.

PREPARATION OF LONDON PORTER.

A late writer has given to the world considerable information respecting the brewing of Porter. His intention being to exhibit the advantages derived from domestic brewing; he has annexed the price of each article of the composition. His list of ingredients in the following proportions, is that used in the first London Breweries.

7 bushels Malt	$4 90
3 lbs. Hops	0 96
6 lbs. Treacle	0 30
3 lbs. Liquorice Root, bruised	1 75
3 lbs. Essentia Bina	0 70
3 lbs. Colouring	0 70
½ oz. Capsicum	0 04
2 oz. Spanish Liquorice	0 08
1 oz. Cocculus Indicus, commonly called Cocculus India Berries	0 04

2 drams Salt of Tartar - - - - - -	0 02
4 oz. Heading - - - - - - -	0 02
3 oz. Ginger - - - - - - - -	0 06
4 oz. Lime, (when slacked: the Limewater is to be poured into the Essentia Bina, or colour in the making.) - - - - -	0 02
1 oz. Linseed - - - - - - - -	0 02
2 drams Cinnamon Bark - - - - -	0 04
	9 65
Fuel - - - - - - - - - -	0 62
Total expense - - -	$10 27

This will produce 90 gallons of good Porter, and 50 gallons of good Table Beer, the cost of the Porter, at the large breweries being $21 and that of the Beer $5. leaving a profit of $15 73.

Observations. The *essentia bina* is composed of eight pounds of moist sugar, boiled in an iron vessel, (for no copper one could withstand the heat sufficiently,) till it becomes of a thick syrupy consistence, perfectly black and extremely bitter.* The colouring is composed of eight pounds of moist sugar boiled till it attains a middle state, between bitter and sweet. It gives that fine mellow colour usually so much admired in good porter. These ingredients are added to the first wort, and boiled with it.

The *heading* is a mixture of half alum and half copperas, ground to a fine powder. It is so called from its giving to porter that beautiful head or froth, which constitutes one of the peculiar properties of porter, and which publicans are so anxious to raise to gratify their customers.

* When making the essentia and colour, observe when it is boiled sufficiently, to make it liquid enough to pour off into the liquor, add a little clear water, or lime water, to bring it to a proper temper: otherwise it will become a hard, dry, burnt substance.

The linseed, ginger, lime-water, cinnamon, and several other small articles, may be added or withheld, according to the taste, custom, or practice of the brewer, being merely optional, and used solely to give a flavour to the beer; hence it is that so many flavours are distinguishable in porter, and that so very few brewers are found to agree with each other in their produce.

Of the articles here enumurated it is sufficient to observe, that however much they may surprise, however pernicious or disagreeable they may appear, they have always been found requisites in the brewing of porter. They must invariably be used by those who wish to continue the taste, flavour, and appearance which they have been accustomed to.

Quantity of Ingredients necessary for Brewing 5 Gallons of Porter.

1 peck Malt	$0 18
¼ lb. of Liquorice Root, bruised	0 08
Spanish Liquorice	0 01
Essentia	0 04
Colour	0 04
Treacle	0 03
Hops	0 04
Capsicum and Ginger	0 02
	$0 44
Fuel	0 14
Total expense	$0 58

This will produce five gallons of good Porter, which bought, would cost $1 17; but being brewed at home for 58 cents, leaves a clear gain of 59 cents.

This saving is enough to pay for time and trouble, and perhaps a woman might not be able to earn in

the same time one cent: by following this plan then every woman will be able to earn something, for, according to the proverb, *money saved is money got.*

The porter will be drinkable in a week, being perfectly wholesome and palatable.

Observations. If it is objected, that many are ignorant of the art of brewing; some instructions are necessary; and if they are followed, every person will be convinced of the possibility and propriety of providing a beverage for his family, by a cheaper and more pleasing method than that of resorting to a public house for every pint of beer which the wants of nature may demand.

Every person intending to brew for himself, must be careful to see the malt measured and ground, and not trust to the corn chandlers, who frequently impose, both in quality and quantity, on those who are so incautious as not to see these things done in their own presence.

The tubs and vessels must be carefully inspected, and proved to be free from dirt or the least taint, as defects of that nature may distaste a whole brewing.

The mash-tub should be particularly attended to, and a wisp of clean hay or straw is to be put over the bottom of the vessel in the inside, to prevent the malt running off with the liquor.

The malt being emptied into the mash-tub, and the water brought to boil, dash the boiling water in the copper with cold water sufficient to stop the boiling, and leave it just hot enough slightly to scald the finger. Brewers use a thermometer, the first mash being usually taken at 180°, and the second at 190°; but as few persons have a brewing thermometer, the

foregoing rule will be found sufficient by a little practice; always remembering to draw off the second mash somewhat hotter than the first. The water being thus brought to a proper temperature by the addition of cold water, lade it out of the copper over the malt till it becomes thoroughly wet, mashing it well to prevent the malt from clotting; when the water is poured on too hot, it sets the malt, closing the body of it; and when that happens it is difficult to recover it. It can only be done by adding cold water. By *setting the malt* is to be understood, its closing the body of the grain, instead of opening it so as to dissolve in the liquor, cover up the mash-tub close so as to compress the steam, and prevent the liquid from evaporating. In small quantities, this should carefully be regarded; in larger ones it does not signify so much.

Let the wort stand an hour and a half, or two hours after mashing, then let the liquor run off into a vessel prepared to receive it; if at first it runs thick and discoloured, draw off one or two pails full, and pour it back again into the mash-tub till it runs clear.

In summer it will be necessary to put a few hops into the vessel which receives the liquor out of the mash-tub, to prevent its turning sour, which the heat of the weather will sometimes endanger. Let the second mash run as before, and let the liquor stand an hour and a half, then run it off, but never let the malt stand dry; keep lading fresh liquor over it till the quantity of wort to be obtained is extracted, always allowing for waste in the boiling.

The next consideration is *boiling the wort.* The first copper full must be boiled an hour, and whilst

boiling, add the several ingredients, except the ginger and cocculus berries. The hops are now to be boiled in the wort, but are to be carefully strained from the first wort in order to being boiled again in the second. Eight pounds is the common proportion to seven bushels of malt; but in summer, the weather being hotter, the quantity must be varied from eight pounds to twelve pounds, according to the heat of the air.

After the wort has boiled an hour, lade it out of the copper and cool it. In summer, it should be quite cold before it is set to work: in winter it should be kept till a slight degree of warmth is perceptible by the finger. When properly cooled set it to work, by adding yeast in proportion to the quantity. If considerable, and if wanted to work quick, add from one gallon to two. Porter should be brought forward quicker than any other liquor except small beer, let it work till it comes to a good deep head, then cleanse it by adding the ginger. The liquor is now fit for barrelling. Fill the barrels full, and let the yeast work out, adding fresh liquor to fill them, till they are quite full and have done working. Now bung the barrels, but keep a watchful eye upon them for some time, lest the beer should suddenly ferment again, and burst them, which is no uncommon accident where due care is not taken; the heat of summer, or a sudden change of weather, will occasion the same misfortune, if the barrels are not watched, and eased when they require it, by drawing the peg.

The only part which remains to complete the brewing is *fining* the beer. To understand this, it is necessary to remark, that porter is composed by brewers of three different sorts of malt; pale, brown, and am-

ber ;—the reason for using these three sorts, is to obtain a peculiar flavour and colour. Amber is the most wholesome, and it is recommended to use none else. In consequence of the subtleness of the essentia, which keeps constantly swimming in the beer, porter requires a considerable body of finings; but should any person choose to brew without essentia, with amber malt and with colour only, the porter will refine of itself very soon. Some, however, will perhaps follow the exact recipe, and therefore it is necessary to mention that finings are composed of isinglass dissolved in stale beer, till the whole becomes of a thin gluey consistence, like size: one pint is the usual proportion to a barrel, but sometimes two, and even three are found necessary. Particular care must be taken that the beer in which the isinglass is dissolved, be perfectly clear and thoroughly stale. By attending to these directions, any person may brew as good, if not better porter than they can be supplied with from the public houses. Many notions have been artfully raised, that porter requires to be brewed in large quantities, and to be long stored, to render it sound and strong, but experience will prove the falsehood of these prejudices which have their origin with the ignorant, and are cherished by the interested. One brewing under another will afford ample time for porter to refine for use, and every person can best judge of the extent of his consumption. Porter is not the better for being brewed in large quantities, except that the same trouble which brews a peck will brew a bushel. This mode of practice will be found simple and easy in its operation, essentially

useful as to health and convenience, and extremely moderate in point of trouble and expense.

PREPARATION OF ALE.

The following is the proportion of ingredients requisite for brewing a barrel of excellent ale.

The same method is to be pursued in almost every respect, as for the brewing of porter. The prices are annexed, in order to shew the absolute saving which may be made in this beverage. Prices fluctuate, but then the article compounded rises or falls in price accordingly; so that the ratio of saving is always the same.

2½ bushels Malt - - - - - - -	$1 75
2 lbs. Hops - - - - - - - -	0 24
3 lbs. Sugar, just boiled up, allowing for fire and trouble in preparing - - - -	0 30
Capsicum 4, Coriander 4 - - - - -	0 08
Cocculus Indicus 2, Salt 4 - - - - -	0 06
	$2 43

The Small Beer, after the Ale is brewed, is supposed an equivalent for Fuel. A barrel of Ale, 128 quarts, at 8 cents per quart, bought at an Inn, $10 24, brewed at home, $2 43, clear gain $7 81.

Observations. Ale is generally brewed from pale malt, but that is merely an optional point; some persons preferring brown, some amber ales.

The capsicum and coriander seeds are to be boiled in the wort; observe the same method of boiling and mashing as in porter; but let ale stand to work two or three days, and beat it up well once or twice a day. When the head begins to fall, cleanse it by

adding a handful of salt, and a little flour; mixed up with the cocculus indicus; then proceed to barrel it.

PREPARATION OF THE MALT BEVERAGE, DENOMINATED SMALL BEER.

Small Beer is an article not formed to keep, and is not likely to be brewed by any persons for their own consumption. The following proportions for one barrel, are inserted, merely to add to general information in the art of brewing.

1½ bushels Malt	$1 05
1 lb. Hops	0 12
1½ lbs. Liquorice Root	0 33
¼ oz. Capsicum	0 02
2 oz. Spanish Liquorice	0 05
5 lbs. Treacle	0 25
	$1 82

One barrel Small Beer, paid for at an Inn, 128 quarts at 4 cents per quart, $5. 12. Brewed at home, Fuel included, $2.—Clear gain, $3 12.

Observations. It is sufficient to observe respecting this liquor, that it requires no storing, being frequently brewed one week, and consumed the next.

The quantity of capsicum in one barrel of small beer is as much as is commonly contained in two barrels of porter, this readily accounts for the preference given to it, by the working classes, in cold winter mornings.

Small beer works remarkably quick, and must be carefully attended to, in the barrels.

PREPARATION OF TEN BARRELS OF TABLE BEER.

Table Beer may be serviceable to a large family, and therefore, the estimate is given upon a larger proportion.

7 bushels Malt	$4 90
8 lbs. Hops	0 96
8 lbs. Colour	0 70
8 oz. Spanish Liquorice	0 20
10 lbs. Treacle	0 50
	$7 26

Ten barrels at $3 per barrel, bought, $30. Ten barrels brewed at home, $7 26.—Clear gain, $22 74.

Liquorice root, and other flavouring substances, may be added: what are here inserted are only the most general, and, (as some suppose) the indispensible requisites.

General observations.—The intoxicating qualities of porter are to be ascribed chiefly to the various drugs intermixed with it. It is evident, some porter is more *heady* than others; this arises from the greater or less quantity of stupifying ingredients. Malt, to produce intoxication, must be used in such large quantities as would very much diminish the brewers profit.

Pale malt is most nutritive, it likewise contains more balsamic qualities than the brown malt, which enduring a greater degree of fire in the kiln is sometimes so crusted and burnt, that its mealy parts lose a great share of the essential salts, and other stimulating properties.

Amber malt is that which is dried in a middling degree, between pale and brown, and is now much

in use, being the most pleasant, and free from either extreme.

Hops are an aromatic grateful bitter, very wholesome, and, undoubtedly efficacious in giving both flavour and strength to the beer. With regard to the quantity of hops, as tastes are different, no regular fixed rule can be given, but every person must be left to adjust, by experience, the quantity which best suits his palate or convenience.

Yeast is necessary to give the liquor that portion of elastic air, of which the boiling deprives it. Without fermentation, or working, no worts however rich can inebriate.

Liquorice root is pleasant, wholesome, and aperient, and opposes the astringent qualities of some of the other ingredients, it ought therefore to be used, as should Spanish liquorice, which possesses the same properties.

Capsicum disperses wind, and when properly used cannot be unwholesome; it leaves a warm glow on the stomach, which is perceptible on drinking some beers.

Ginger has the same effect as capsicum; it furthermore, cleanses and flavours beer. But capsicum being cheaper, is more used; and by its tasteless, though extremely hot quality, cannot be so readily discerned in beer as ginger.

Treacle partakes of many of the properties of liquorice. By promoting the natural secretions, it must be a principal means of rendering porter and beer, in general wholesome. Treacle is also a cheaper article than sugar, and answers the purposes of colour, where the beer is intended for immediate con-

sumption; but, in summer, where a *body* is required to withstand the temperature of the air; and the draught is not quick, sugar alone can give body to porter. Treacle, therefore, is a discretionary article.

Coriander seed, used principally in ale, is warm and stomachic; but when used in great quantity, it is pernicious.

Cocculus Indicus is poisonous and stupifying when taken in any considerable quantity. When ground into fine powder it is undiscoverable in the liquor, and it is but too much used to the prejudice of the public.

Heading: Salt of steel is most proper, but a mixture of alum and copperas, being much cheaper, has obtained the preference. Alum is a great drier, and causes that thirst which some beer occasions; so that the more you drink, the more you want. Alum gives likewise a smack of age to the beer and is penetrating to the palate. The properties of copperas are well known to be dangerous, and therefore need no comment. Salt is highly useful in all beers; it gives a pleasing relish, and also fines the liquor.

Different conveniences of cellaring will materially affect beer.—If the cellar is bad, brew only for present use. In this case, six weeks will be found a very proper space betwixt brewing and brewing. Where beer is kept too long in a bad cellar, so as to be affected by the heat of the weather, it will putrefy, though ever so well bunged. Hops will not prevent this accident happening to beer; they only prevent its turning sour.

A number of persons not reflecting upon the influence of the air,—as soon as summer approaches, be-

gin to think directly of brewing ale, which seldom, or never is so good as that brewed in a proper season. For instance, the extreme variations of heat in this country are from 16 to 88 degrees. Now, on brewing at 16°, great care must be taken that it does not get too cold; whereas, on brewing at 88°, the operator will hardly be able to get it cold enough, and must take the dead of the night to reduce it down to a medium heat, which should be about 60°. This observation is too striking not to enforce upon every one's mind the necessity of carefulness and attention in this respect. The effect on wort when working is exactly the same. In cool weather the spirit of the beer is retained, and it is thereby enabled to work the liquor clear; whereas in hot weather, the spirit quickly evaporates, leaving the wort vapid and flat, unable to work itself clear, but keeping continually on *the fret*, till totally spoiled. This is the obvious reason for the use of sugar, prepared for colour, because sugar will bear the heat better than malt; and when thoroughly prepared, possesses such a strong principle of heat in itself, as to bid defiance to the hottest temperature of the air, and to render its turning sour impossible.

As instances of the effects of both: two casks of the same brewing have been sent into one house, the one prepared with colour, and the other without; on tasting both, the cask prepared with colour was very much commended, and the other returned as not drinkable.

Clean casks are an essential object in brewing good beer. To keep the casks sweet and in order, never allow them to remain open, but whenever the

beer is drawn off, bung them up tight with the lees within them. In a good cellar they will never spoil. Should the casks get musty, the following method will remedy the evil. Soak them well for two or three days in cold water, then fill them full of boiling hot water; now put in a lump or two of lime, shake it thoroughly till quite dissolved, let them stand about half an hour, then wash them out with cold water, and they will be clean and sweet.

TO PREVENT BEER FROM GROWING FLAT.

Put into a cask, containing eighteen gallons, a pint of ground malt, suspended in a bag, and close the bung perfectly; the beer will be improved during the whole time of drawing it for use.

TO RECOVER BEER, WHEN SOUR.

When beer is become sour, add some oyster-shells calcined to whiteness, or a little powdered chalk.—Either of these will correct the acidity, and will make it brisk and sparkling. It should be drank almost immediately afterwards. Some use salt of tartar.

TO BOTTLE PORTER.

It has been supposed by many persons, that on bottling porter there is some preparation made use of, not generally understood: readers may rest assured that nothing more is necessary to produce good bottled porter, than attention to the following rules:

Let the bottles be clean washed and drained dry—the corks sound and good, for this is essential.

Fill the bottles on one day, and let them stand open till the next; this will bring the beer to a pro-

per flatness, and prevent the corks from flying, or the bottles from bursting. Let the bottles be corked as close as possible.

These rules will apply equally well to the bottling of ales.

Although it is not necessary, or perhaps proper, to make use of all the ingredients here mentioned, still by attention to the foregoing observations, all persons may suit themselves in taste, in strength, in flavour, and in quantity. They will have beer much cheaper: they will have it more wholesome. Every person may judge of his own taste in beer. Grains of paradise, which have a warm and pleasant quality; cardamon seeds and cinnamon, linseed, alspice, and a variety of other flavouring substances, may be chosen by different persons.

CHEAP AND WHOLESOME TABLE BEER.

To four pounds of coarse brown sugar, add ten gallons of water, then put in three ounces of hops, and let the whole boil for three quarters of an hour, and work it as usual. It should be kept a week or ten days before it is tapped; when it will improve daily afterwards, within a moderate time of consumption.

Another method, and for a smaller quantity, is, to put a pound of treacle to eight quarts of boiling water, add two bay-leaves and a quarter of an ounce of ginger in powder. Boil the whole for fifteen minutes, then let it become cool, and work it with yeast.

GINGER BEER.

To every gallon of spring water, add one ounce of sliced white ginger, one pound of common loaf sugar,

and two ounces of lemon juice; boil this mixture nearly an hour, and take off the scum; then run it through a hair sieve into a tub, and when cool, (viz. at 70°) add yeast in proportion of half a pint to nine gallons; keep it in a temperate situation two days, during which it may be stirred six or eight times; then put it into a cask, which must be kept full, and the yeast taken off at the bung-hole with a spoon. In a fortnight, add half a pint of fining (isinglass picked and steeped in beer,) to nine gallons, which will if it has been properly fermented, clear it by ascent. The cask must be kept full, and the rising particles taken off at the bung-hole. When fine, (which may be expected in twenty four hours,) bottle it, cork it well, and in summer it will be ripe and fit to drink in a fortnight.

WINES.

Having described the processes for preparing several malt liquors as above, it will now be proper to notice the methods used for converting the juices of fruits, &c. into those beverages which are technically known under the appellation of Wines. These, like malt liquors, are fermented by the addition of yeast.

CURRANT WINE.

Boil four gallons of spring water, and stir into it eight pounds of honey; when thoroughly dissolved, take it off the fire; then stir it well about, to raise the scum, which take clean off, and cool the liquor.

When thus prepared, press out the same quantity of the juice of red currants moderately ripe, which being well strained, mix well with the water and honey; then put them into a cask or large earthen vessel, and let them stand upon the ferment, for twenty four hours; then to every gallon add two pounds of fine sugar, stir them well to raise the scum, and when well settled, take it off, and add half an ounce of cream of tartar with the whites of two or three eggs to refine it. When the wine is well settled and clear, draw it off into a small vessel, or bottle it up, keeping it in a cool place.

Of white currants, a wine after the same manner may be made, that will equal in strength and pleasantness many sorts of white wine; but as for the black, or Dutch currants, they are seldom used, except for the preparation of medicinal wines.

Another Method.—After gathering the currants, when the weather is dry, strip them carefully from the stalks, put them into a pan, and bruise them with a wooden pestle. Let the mass stand about twenty hours, after which strain it through a sieve. Add three pounds of fine sugar to every four quarts of the liquor, and shaking or stirring it well, fill the vessel, and put about a quart of brandy to every six or seven gallons. As soon as it is fine, which will be in four or five weeks—bottle it off. If it should not prove quite clear, draw it off into another vessel, and let it stand about ten days, and then bottle it off.

GOOSEBERRY WINE.

When the weather is dry, gather gooseberries about the time they are half ripe; pick them clean, put the

quantity of a peck in a convenient vessel, and bruise them with a piece of wood, taking as much care as possible to keep the seeds whole. Now having put the pulp into a canvas bag, press out all the juice; and to every gallon of the gooseberries add about three pounds of fine loaf sugar; mix the whole together by stirring it with a stick, and as soon as the sugar is quite dissolved, pour it into a convenient cask which will hold it exactly. If the quantity be about eight or nine gallons, let it stand a fortnight; if twenty gallons, forty days, and so on in proportion; taking care the place you sit it in be cool. After standing the proper time draw it off from the lees and put it into another clean vessel of equal size, or into the same, after pouring the lees out, and making it clean; let a cask of ten or twelve gallons stand for about three months, and twenty gallons for five months, after which it will be fit for bottling off.

BRITISH CHAMPAIGNE.

Take gooseberries before they are ripe, crush them with a mallet in a wooden bowl, and to every gallon of fruit put a gallon of water; let it stand two days, stirring it well; squeeze the mixture well with the hands through a hop sieve; then measure the liquor, and to every gallon put three pounds and a half of loaf sugar; mix it well in the tub, and let it stand one day; put a bottle of the best brandy into the cask; which leave open five or six weeks, taking off the scum as it rises; then make it up, and let it stand one year in the barrel before it is bottled.

Observation. The proportion of brandy to be used for this liquor, is one pint to seven gallons.

ELDER WINE.

When the elderberries are ripe, pick them, and put them into a stone jar, which set in boiling water, or rather in an oven, till the jar is as warm as the hand can well bear to touch it. Now strain the berries through a sieve or coarse cloth, squeezing them hard, and pour the liquor into a kettle. Put it on the fire, let it boil, and put in as many pounds of Lisbon sugar as there are quarts of juice ; and skim it often; then let it settle, pour it off into a vessel and cover it close. This juice should be poured into a well seasoned cask, and mixed with honey-water, (that is, honey boiled with water,) in the proportion of three gallons of the latter to a barrel of the former. Now ferment the compound with yeast; and afterwards clarify it by flour, whites of eggs, and a small portion of saltpetre. Now draw it from the settlings, and keep it till spring ; then to every barrel add five pounds of its own flowers, and as much loaf sugar, and let it stand seven days ; at the end of which time it will be very rich and have a good flavour.

Many people mix it with their raisin wine, by putting half a pint of the elder syrup to every gallon of wine ; it gives the raisin wine an exquisitely fine flavour.

ELDER FLOWER WINE.

To six gallons of spring water put six pounds of sun raisins cut small, and a dozen pounds of fine sugar ; boil the whole together for about an hour and a half. When the liquor is cold put half a peck of ripe elder flowers in, with about a gill of lemon juice and half the quantity of ale yeast, cover it up ; and

after standing three days, strain it off. Now pour it into a cask that is quite clean, and that will hold it with ease. When this is done, put a quart of Rhenish to every gallon of wine, let the bung be lightly put in for twelve or fourteen days; then stop it down fast, and put it in a cool dry place for four or five months, till it is quite settled and fine, then bottle it off.

MORELLA WINE.

Cleanse from the stalks, sixty pounds of morella-cherries, and bruise them so that the stones shall be broken. Now press out the juice and mix it with six gallons of sherry wine, and four gallons of warm water. Having grossly powdered separate ounces of nutmeg, cinnamon, and mace, hang them separately in small bags, in the cask containing the mixture. Bung it down: in a few weeks it will become a deliciously flavoured wine.

CHERRY WINE.

Take cherries, nearly ripe, of any red sort, clear them of the stalks and stones, then put them into a glazed earthen vessel, and squeeze them to a pulp. Let them remain in this state for twelve hours to ferment; then put them into a linen cloth, not too fine, and press out the juice with a pressing board, or any other convenient instrument. Now let the liquor stand till the scum rises, and with a ladle or skimmer take it off clean; then pour the clearer part, by inclination, into a cask, where to each gallon put a pound of the best loaf sugar, and let it ferment for seven or eight days. Draw it off, when clear, into

lesser casks, or bottles; keep it cool as other wines, and in ten or twelve days it will be ripe.

PEACH AND APRICOT WINE.

Take peaches, nectarines, &c. when they are full of juice, pare them and take the stones out, then slice them thin, and put over them from a gallon to two gallons of water. and a quart of white wine. Place the whole on a fire to simmer gently for a considerable time, till the sliced fruit becomes soft; now pour off the liquid part into another vessel, containing more peaches that have been sliced but not heated; let them stand for twelve hours, then pour out the liquid part, and press what remains through a fine hair bag. Let the whole be now put into a cask to ferment; then add of loaf sugar, a pound and a half to each gallon. Boil well, an ounce of beaten cloves in a quart of white wine, and add it, this will give the wine a delicious flavour.

Wine of apricots may be made by only bruising them and pouring the hot liquor on them. This wine does not require so much sweetening. To give it a curious flavour, boil an ounce of mace, and half an ounce of nutmegs, in a quart of white wine; and when the wine is fermenting pour the liquid in hot. In about twenty days, or a month, these wines will be fit for bottling.

EXCELLENT COMPOUND WINE.

An excellent family wine may be made of equal parts of red, white, and black currants, ripe cherries and raspberries, well bruised and mixed with soft water, in the proportion of four pounds of fruit to

one gallon of water. When strained and pressed, three pounds of moist sugar are to be added to each gallon of liquid. After standing open for three days, during which it is to be stirred frequently; it is to be put into a barrel, and left for a fortnight to work, when a ninth part of brandy is to be added, and the whole bunged down. In a few months it will be a most excellent wine.

QUINCE WINE.

Gather the quinces when pretty ripe, in a dry day, rub off the down with a linen cloth, then lay them in hay or straw for ten days to *perspire.* Now cut them in quarters, take out the cores, and bruise them well in a mashing tub with a wooden pestle. Squeeze out the liquid part, by pressing them in a hair bag, by degrees, in a cider press; strain this liquor through a fine sieve, then warm it gently over a fire and skim it, but do not suffer it to boil. Now sprinkle into it some loaf sugar reduced to powder; then in a gallon of water and a quart of white wine, boil a dozen or fourteen large quinces thinly sliced; add two pounds of fine sugar, and then strain off the liquid part, and mingle it with the natural juice of the quinces; put this into a cask, (not to fill it) and mix them well together; then let it stand to settle: put in two or three whites of eggs, then draw it off. If it is not sweet enough, add more sugar, and a quart of the best malmsey. To make it still better, boil a quarter of a pound of stoned raisins, and half an ounce of cinnamon bark, in a quart of the liquor, to the consumption of a third part, and straining it, put it into the cask when the wine is fermenting.

BIRCH WINE.

The season for obtaining the liquor from birch-trees is in the latter end of February or the beginning of March, before the leaves shoot out, and as the sap begins to rise. If the time is delayed, the juice will grow too thick to be drawn out. It should be as thin and clear as possible. The method of procuring the juice, is by boring holes in the trunk of the tree and fixing facets of elder; but care should be taken not to tap it in too many places at once, for fear of injuring the tree. If the tree is large, it may be bored in five or six places at once, and bottles are to be placed under the apertures for the sap to flow into. When four, or five gallons have been extracted from different trees, cork the bottles very close, and wax them till the wine is to be made, which should be as soon as possible after the sap has been obtained. Boil the sap, and put four pounds of loaf sugar to every gallon, also the peel of a lemon cut thin, then boil it again for nearly a hour, skimming it all the time. Now pour it into a tub, and as soon as it is almost cold, work it with a toast spread with yeast, and let it stand five or six days, stirring it two or three times each day. Into a cask that will contain it, put a lighted brimstone match, stop it up till the match is burnt out, and then pour the wine into it, putting the bung lightly in, till it is done working. Bung it very close for about three months, and then bottle it. It will be good in a week after it is put into the bottles.

ORANGE WINE.

To six gallons of water put fifteen pounds of soft sugar; before it boils, add the whites of six eggs well beaten, and take off the scum as it rises; boil it half an hour; when cool, add the juice of fifty oranges, and two-thirds of the peel cut very thin; and immerse a toast covered with yeast. In a month after it has been in the cask, add a pint of brandy and two quarts of Rhenish wine: it will be fit to bottle in three or four months, but it should remain in bottles twelve months before it is drank.

GINGER WINE.

To seven gallons of water put nineteen pounds of clayed sugar, and boil it for half an hour, taking off the scum as it rises; then take a small quantity of the liquor, and add to it nine ounces of the best ginger bruised. Now put it all together, and when nearly cold, chop nine pounds of raisins, very small and put them into a nine gallon cask (beer measure) with one ounce of isinglass. Slice four lemons into the cask, taking out all the seeds, and pour the liquor over them, with half a pint of fresh yeast. Leave it unstopped for three weeks, in about three months it will be fit for bottling.

Observations. There will be one gallon of the sugar and water more than the cask will hold at first: this must be kept to fill up, as the liquor works off; as it is necessary the cask should be kept full, till it has done working. The raisins should be two-thirds Malaga, and one-third Muscadel. Spring and Autumn are the best seasons for making this wine.

PARSNIP WINE.

To twelve pounds of parsnips cut in slices, add four gallons of water, boil them till they become quite soft. Squeeze the liquor well out of them, run it through a sieve, and add to every gallon three pounds of loaf sugar. Boil the whole three quarters of an hour, and when it is nearly cold add a little yeast.—Let it stand for ten days in a tub, stirring it every day from the bottom, then put it into a cask for twelve months : as it works over fill it up every day.

IMITATION OF CYPRUS WINE.

To ten gallons of water, put ten quarts of the juice of white elderberries, pressed gently from the berries by the hand, and passed through a sieve, without bruising the seeds : add to every gallon of liquor three pounds of Lisbon sugar, add to the whole quantity, two ounces of ginger sliced, and an ounce of cloves. Boil this nearly an hour, taking off the scum as it rises, and pour the whole, to cool, in an open tub, and work it with ale yeast, spread upon a toast of bread, for three days. Then turn it into a vessel that will just hold it, adding about a pound and a half of bruised raisins, to lie in the liquor till drawn off, which should not be till the wine is fine.

Observation. This wine is so much like the fine rich wine brought from the island of Cyprus, in colour, taste, and flavour, that it has deceived the best judges.

MEAD.

To thirteen gallons of water, put thirty pounds of honey, boil and skim it well, then add of rosemary,

thyme, bay leaves and sweet briar, about a handful altogether. Boil the whole for an hour; then put it in a tub, with two or three handfuls of ground malt; stir it till about blood warm; then strain it through a cloth, and put it into the tub again. Now cut a toast, and spread it over with good ale yeast, and put it into the tub. When the liquor has properly fermented, put it into a cask, then take of cloves, mace and nutmegs, each an ounce and a half; of ginger sliced an ounce, bruise the spices and tie them up in a cloth, and hang it in the vessel, which stop up close for use.

COWSLIP WINE.

Boil five pounds of loaf sugar with four gallons of water, simmer them over a fire for half an hour, and when taken off, and cold, put in half a peck of cowslip flowers, clean picked and gently bruised. Now add two spoonfulls of ale-yeast, and a pound of syrup of lemons, with a lemon peel or two. Pour the whole into a well seasoned cask or vessel, let them stand close stopped for three days, that they may ferment well; then put in some juice of cowslips, and give it a convenient space to work. When it has stood a month, draw it off into bottles, putting a little lump of sugar into each, by which means it may be kept well for the space of a year. In like manner, wines may be made of other flowers which possess a pleasant taste and odour, as oxlips, jessamine, &c.

GILLIFLOWER WINE.

To three gallons of water, put six pounds of the best raw sugar; boil the sugar and water together for the space of half an hour, keep skimming it as

the scum rises. Now let it stand to cool, beat up three ounces of Syrup of Betony with a large spoonful of ale yeast put into the liquor, and having a peck of gilliflowers, cut from the stalks, put them in, to infuse and work together for three days, the whole being covered with a cloth; strain it and put it into a cask, let it settle for three or four weeks, and then bottle it.

MULBERRY WINE.

On a dry day, gather mulberries, when they are just changed from redness to a shining black, spread them thinly on a fine cloth, or on a floor or table, for twenty-four hours; and press them. Now boil a gallon of water with each gallon of juice; putting to every gallon of water, an ounce of cinnamon bark, and six ounces of sugar candy, finely powdered.—Skim and strain the water when it is taken off and settled, and put it to the mulberry-juice. Now add to every gallon of the mixture, a pint of white or Rhenish wine. Let the whole stand in a cask to ferment, for five or six days. When settled draw it off into bottles and keep it cool.

RASPBERRY WINE.

Gather the raspberries when ripe, husk them, and bruise them; then strain them through a bag into jars or other vessels. Boil the juice, and to every gallon put a pound and a half of lump sugar. Now add whites of eggs, and let the whole boil for fifteen minutes; skimming it as the froth rises. When cool and settled, decant the liquor into a cask, adding yeast to make it ferment. When this has taken place add a pint of white wine, or half a pint proof spirit

to each gallon contained in the cask, and hang a bag in it containing an ounce of bruised mace. In three months, if kept in a cool place, it will be a very excellent and delicious wine.

FRENCH METHOD.

Steep two gallons of raspberries in a gallon of sack for twenty four hours, them strain them, and put to the liquor three quarters of a pound of sun raisins well stoned. Let them continue for four or five days, sometimes stirring them well; then pour the liquid off gently, and bottle it up. If not sweet enough add some sugar, about half a pound to a gallon will be sufficient; keep it in a cool place.

DAMSON WINE.

Take a considerable quantity of damsons and common plumbs inclining to ripeness; slit them in halves so that the stones may be taken out, then mash them gently, and add a little honey and water. Add to every gallon of the pulp a gallon of spring water, with a few bay leaves and cloves; boil the mixture, and add as much sugar as will well sweeten it, skim off the froth and let it cool. Now press the fruit, squeezing out the liquid part; strain all through a fine strainer, and put the water and juice together in a cask. Having allowed the whole to stand and ferment for three or four days, fine it with white sugar, flour and whites of eggs, draw it off into bottles, then cork it well, in twelve days it will be ripe, and will taste like weak port, having a flavour of canary.

AMERICAN WINE.

The following was communicated to the public by Joseph Cooper, Esq. of New-Jersey.

"I put a quantity of the comb, from which honey had been drained, into a tub, and added a barrel of cider, immediately from the press; this mixture was well stirred, and left for one night. It was then strained before fermentation took place; and honey was added, until the specific gravity of the liquor was sufficiently to bear an egg. It was then put into a barrel; and after the fermentation commenced, the cask was filled every day, for three or four days, that the froth might work out of the bung hole. When the fermentation moderated, I put the bung in loosely lest stopping it tight might cause the cask to burst. At the end of five or six weeks, the liquor was drawn off into a tub; and the whites of eight eggs, well beaten up, with a pint of clean sand, were put into it. I then added a gallon of cider spirit; and after mixing the whole together, I returned it in to the cask, which was well cleaned, bunged tight, and placed in a proper situation for racking off, when fine. In the month of April, following, I drew it off into kegs, for use; and found it equal to almost any foreign wine: in the opinion of many judges it was superior.

Observations. This success has induced me to repeat the experiment for three years; and I am persuaded, that, by using clean honey instead of the comb, as above described, such an improvement might be made, as would enable the citizens of the United States to supply themselves with a truly *federal* and wholesome wine, which would not cost a quarter of a dollar per gallon, were all the ingredients

procured at the market price. It would have this peculiar advantage, that it contains no foreign mixture, but is made from ingredients produced on our own farms."

RAISIN WINE.

Put two hundred weight of raisins, with the stalks into a hogshead, and fill it almost with spring water; let them steep for about twelve days, frequently stirring, and after pouring off the juice, dress the raisins, and mash them. The whole should be put together in a clean vessel that will exactly contain it. It will hiss for some time, during which it should not be stirred; but when the noise ceases, it must be stopped close, and stand for about six or seven months; and then, if it proves fine and clear, rack it off into another vessel of the same size. Stop it up and let it remain for twelve or fourteen weeks longer, then bottle it off. If it should not prove clear, fine it down with three ounces of isinglass, and a quarter of a pound of sugar candy, dissolved in some of the wine.

RAISIN WINE, EQUAL TO SHERRY.

Let the raisins be well washed and picked from the stalks; to every pound thus prepared and chopped, add one quart of water, which has been boiled and has stood till it is cold. Let the whole stand in the vessel for a month, being frequently stirred; now let the raisins be taken from the cask, and let the liquor be closely stopped in the vessel. In the course of a month let it be racked into another vessel, leaving all the sediment behind, which must be repeated till it becomes fine; when add to every ten

gallons, six pounds of fine sugar, and one dozen of Seville oranges, the rinds being pared very thin, and infused in two quarts of brandy, which should be added to the liquor at the last racking. Let the whole stand three months in the cask, when it will be fit for bottling; it should remain in the bottles for a twelvemonth.

To give it the flavour of Madeira, when it is in the cask, put in a couple of green citrons, and let them remain till the wine is bottled.

GRAPE WINE.

To every gallon of ripe grapes, put a gallon of soft water, bruise the grapes, let them stand a week without stirring, and draw the liquor off fine; to every gallon of wine put three pounds of lump sugar; put the whole into a vessel, but do not stop it till it has done hissing, then stop it close, and in six months it will be fit for bottling. A better wine, though smaller in quantity, will be made by leaving out the water and diminishing the quantity of sugar. Water is necessary, only where the juice is so scanty, or so thick, as in cowslip, balm, or black currant wine, that it could not be used without it.

Observations. It will here be necessary for the reader's information, to examine the peculiar qualities on which the excellency of several foreign wines depends. Spain and Portugal being those countries of Europe were vines are cultivated in the greatest perfection, and where the most careful attention is paid to the manufacture of the several sorts of wine, we shall in this place take a summary view of each.

SPANISH AND PORTUGUESE WINES.

The wines of Spain are of two descriptions, viz.: white and red, and are, for the most part, excellent. The greatest quantities are made in the southern parts of the kingdom, and the sale is very extensive, especially among the English and Dutch. The wines of the Canaries, although not actually Spanish, are to be met with in most of the parts of Spain, and are usually classed with the wines of that country. Although the whole of the Canaries produce excellent wines, the preference is given to those of Parma and Teneriffe. When the vintage proves favourable, Teneriffe annually makes up about 30,000 pipes of Vidonia, or as it is sometimes denominated *Bastard Madeira*, from the similarity of its flavour and appearance to the dry wine of the last mentioned Island. Teneriffe also produces a sweet wine, which is nearly similar to Malmsey Madeira.

The wine of Chacoli in Biscay is not of a first rate quality. In order to produce this wine the Biscayans ingraft five or six different vines upon the same stalk. Most parts of Biscay abound in these vines, which border the high roads, generally growing to the height of about three or four feet. The wine in Biscay is sold at a certain price, as regulated by the police, and until the whole produce of the vintage is disposed of, no foreign wine is permitted to be brought into the province; hence it happens that the sole study of the proprietors of vineyards is to collect a large quantity of wine, without attending to quality or flavour, and consequently *Chacoli* has become proverbially despicable in Spain. Indeed, the grapes are not allowed to arrive at a state of maturity, but

are gathered and squeezed, while sour and nearly devoid of substance: but, if the juice were allowed to collect and meliorate in the grape, if the green fruit were not mingled with the ripe, if the wines were made with the same care as those of other province, this wine would prove equal in every respect (except that of seniority) to the French *Champaign*, which, of its kind, stands at present unrivalled.

The wine of Guidas in Castile is made from cherries, and is a species of ratafia. Foucal wine, which takes its name from a village near Madrid, is of a good quality, but is only reckoned ordinary.

The wines of Val de Penas, Ciudad Real, Ribadavia, and Rioxa, and those called La Mancha are very good, and except in regard to different degrees of colour, are similar in every respect.

The best wines of Arragon are those denominated Garnachas, from the species of grape which produces them: the best of all is a red wine named Hospital; it is excellent as to flavour and strength. Caninea, called likewise white Garnachas, is very fine, and is much esteemed.

The wines of Peralta, Tudela, Tafalla, and Arandillo, in Navarre, are nearly alike, and are excellent both as to flavour and quality. That of Peralta is well known under the title of Rancio, which it receives when old enough to merit that distinction. To these may be added the wine of Huesca, which is very good.

The wines of Xeres, better known under the name of Sherry, are made at the town of that name, in the province of Andalusia. They are not only dry, but sweet; the dry, however, are the most esteemed.

more particularly when they present a pale straw colour. Many, who are in the habit of tasting Sherry, have doubtless perceived that there is something in its flavour which partakes of the taste of leather; this is owing to the custom of bringing the wines down the country in large leathern vessels, or as the Spaniards call them, *boots;* whence we derive our term, butts, which we bestow upon the casks wherein we receive the wines.

In Andalusia are made sweet and dry wines, called Pagarete and San Lucar, and the strong well known red wine, denominated Tinto Rota, or Tent, which is an excellent stomachic. The Montilla is a dry wine. The territory of Xeres, alone, annually produces above 60,000 pipes of wine.

In the province of Grenada is made the celebrated wine called Mountain or Malaga. It is dry and sweet, and both red and white. It is truly a delicious wine, and is much esteemed. The sweet mountain is the most sought after, and is usually employed as a dessert wine. Grenada produces Peroximenes or Pedro Ximenes, which is a very fine flavoured, full bodied wine. There is also a kind of Malmsey made in this province, which is exquisite; but that of Maravella is only an ordinary wine.

In Valentia is found the Tinto Alicante, a wine much used in France; it is sweet when new, but grows thick and ropy as it becomes aged: it is a good stomachic.

The Benicarlo wine is red, dry, and thick; it is often palmed upon the public by wine dealers, as Port wine; to which it is very inferior, both in quality and price. An imposition of this sort is to be

avoided, by observing whether the wine offered have a ruby colour, instead of a deep black; a generous flavour, and not that harshness which immediately offends a good palate: if not, it assuredly cannot be Port wine. The wine called Siches, and that called Garnache, both made in Catalonia, are exquisite. In the same province are made Tinto de las Montanos, or Mountain Tent, and Mataro wine; both of which are sweet, thick, ropy, and unwholesome. The latter is often sold by irreputable traders, to private families, as Tent.

It is almost needless to observe that the wine called Port, of which such vast quantities are consumed in Great Britain, is the produce of Portugal. The vines, whence it is made, grow upon the banks of the Douro, about fourteen or fifteen leagues from Oporto, and occupy a space about six leagues in length, and two leagues in breadth. These vineyards produce between 60 and 70,000 pipes of Port, and there are others which yield nearly 6,000 pipes annually. The vine whence we derive our Port, originally grew in Burgundy; but the climate of Portugal being widely different from that of Burgundy, has caused such an alteration in the grape, that no two wines are more unlike than those which are the produce of the above mentioned territories.

The wines of Portugal, like those of Biscay, are only sold at the prices annually regulated by the government. As soon as the prices are promulgated, the factory and individuals send in their names to the proprietors of the wines; the whole of the Port wine is shipped at Oporto.

The brandy of Spain constitutes a considerable article of commerce; it is very inferior to the brandy of France, and is principally used in making up Spanish and Portuguese wines. The brandy of Portugal is nearly the same as that of Spain, and very little of it is exported.

Notwithstanding the great natural produce of wines, various attempts have been made and with success, at a *synthetical* preparation of this beverage. It is to be feared, that this practice is sometimes carried on, without regard either to science or humanity. Indeed there are many compounds sold in London and elsewhere, intended to imitate Port and other wines, which agree with them in no character save in colour and astringency; and these, it is known, are given to them by the most pernicious ingredients.

But the French, and other chemists, have really produced wines, which possessed all the agreeable properties of those produced from grapes. This was done, by first analysing the wine to be imitated, and then, by apportioning the quantities of the several ingredients which existed in the wine naturally. In this way, Fabroni made wine, from 864 pounds of sugar, 24 pounds of gum arabic, 24 pounds of tartar, 3 pounds of tartarous acid, 36 pounds of gluten of wheat, and 1728 quarts of water. Parmentier made a good Muscadine wine from 216 pounds sugar, nine pounds of crystals of tartar, 72 of elderflowers, and 307 of water. The colonists in the West Indies, prepare a wine from 250 lbs. of sugar, two barrels of water, and four pounds of yeast; this wine is coloured with litmus, and scented with some essential oil.

In addition to these *synthetical* preparations, it may be observed, that others of an analogous, but of a more surprising nature, have recently been effected. Kirchoff, a Russian chemist, discovered that starch may be converted into sugar, possessing all the properties of sugar from grapes, by mixing it with about four times its weight of water, and about one hundredth part of its weight of sulphuric acid. This discovery was confirmed by Saussure, who ascertained that 100 parts of starch became 110.14 parts when converted into sugar. The same subject being successfully resumed by M. Braconnot, he discovered the important fact, that a sugar similar to that of grapes, may be obtained by means of sulphuric acid, from the sawings of wood, old linen, and paper.

In this operation, a certain quantity of these substances is treated with sulphuric acid, concentrated by cold. The mass appears to be carbonised, but this appearance arises from a stratum of black powder which covers it; and which when removed by washing, is converted into a true gum, resembling gum arabic. This gum is separated from the sulphuric acid, in excess, by means of the carbonate of lime, and it remains in the liquor. By afterwards treating this gum with sulphuric acid, diluted with water, it is converted into true sugar, the quantity of which is greater than that of the sawings of wood, or the linen employed. In addition to this sugar, which forms almost the whole of the mass, M. Braconnot obtained another substance, which he called the *vegeto sulphuric acid.* The sugar in question, was of the consistency of syrup; at the end of twenty four hours it began to chrystalize, and some days after the whole

was condensed into a single mass of crystalized sugar, which was pressed strongly between several folds of old cloth; crystalized a second time, this sugar was passably pure; but treated with animal charcoal, it became of a shining whiteness. The crystals were in spherical groups, which appear to be formed by the union of small diverging and unequal plates. They are fusible at the temperature of boiling water. The sugar is of a fresh and agreeable flavour, producing in the mouth a slight sensation of acidity.

Mingled in a proper quantity of water, set in fermentation, and hopped according to the method of brewers, the syrup above mentioned furnishes a beer, which is light, brisk, strong, and of an agreeable savour.

After having ascertained that all ligneous matter, such as wood, bark, straw, hemp, &c., may be transformed into gum, and into sugar, by sulphuric acid; M. Braconnot extended his researches to the parts of animals, and he began with gelatine, as obtained from the skin, membranes, tendons, &c., of animals. He found that gelatine may be converted by sulphuric acid into a crystalizable sugar *sui generis*, which probably does not exist in nature. It crystalizes more readily than that from the cane. It is less fusible, and it contains azote. Its sweetness is nearly equal to that of the sugar of grapes. Its solubility in water is not greater than that of sugar of milk, with which it has, at first sight, some analogies. By slow evaporation, it yields crystals as hard as sugar candy, and in the form of flat prisms, or tables grouped together. He also found that the sugar of gelatine combines intimately with the nitric acid, (with sensi-

ble decomposition, and even without the aid of heat,) and then forms a new acid, to which he has given the name of the *nitro-saccharic.*

DISTILLATION.

The object of distillation is the preparation of spirituous and other volatile liquors. These consist of alcohol or pure spirit, which is obtained from any spirituous liquor; brandy, rum, arrack, and whiskey, prepared from wine, sugar, rice, and malt; and compound spirits, or those which, in addition to alcohol, contain some volatile or pungent oil or essence—as gin, hollands, carraway, and peppermint; the essential oils, as oil of cinnamon, oil of cloves, oil of peppermint, and otto of roses; and the simple distilled waters, which retain the fragrant flavour of the particular herbs with which they have been distilled.

We shall here detail the several modes of operation, which are commonly adopted, for the distillation of liquors, strongly impregnated by alcohol or ardent spirit.

Although brandy, rum, arrack, geneva, malt spirits, &c., differ much in colour, taste, smell, and other properties, the spirituous part, or alcohol, is the same in all: their peculiar properties depending, generally, upon the presence of some essential oil, and water in varied proportions.

Previous to the operation of distilling, those of brewing and fermentation are necessary. The fermentation ought always to be carried on as slowly as

possible, and performed in vessels closely stopped, only having at the bung a valve pressed down by a spring, which will yield with less force than is sufficient to burst the vessel. It should even be suffered to remain till it has become perfectly fine and transparent; as by this means the spirit will not only be superior in quantity, but also in fragrance, pungency, and vinosity, to that otherwise produced.

With regard to performing the operation of distilling, there is only one general rule that can be given, namely, to let the heat, in all cases, be as gentle as possible. A water bath, if sufficiently large, is preferable to any other mode, and will perform the operation with all the dispatch requisite for the most extensive business.

As the end of rectification is to make the spirit clean as well as strong, or to deprive it of the essential oil, as well as of the aqueous part, it will be proper to have regard to this, even in the first distillation. For this purpose, the spirit, as it first comes over, should be received into a quantity of cold water; as by this means the connexion between it and the oily matter will be considerably lessened. For the same reason, after it has once been rectified in the water-bath, it should be again mixed with an equal quantity of water, and distilled a second time. Thus the spirit will be freed from most of the oily matter, even though it has been very much impregnated with it, at first. After the spirit has been distilled, once or twice, in this manner, from water, it may be distilled in a water-bath without any addition; and this last rectification will free it from the greater part of the water it may contain. In distilling compound

spirits, a small still has been found to answer better than a large one.

A distiller's apparatus should be erected in an out building, to prevent any hazard which might arise from fire;—spirituous liquors being remarkable combustible. If such an accident should occur, a woolen blanket, or rug, hung over a roller in a water butt, is the readiest and best extinguisher. Let the distillery be large enough not only in regard to the room required for the still, the worm-tub and the pump, (which should be all ranged together,) but also, that the spirits and wash, &c. may be contiguous to the still, for the convenience of filling or charging it. Room is also required for empty vessels, tubs, casks, and other utensils. The still-house floor should be paved or flagged, with a considerable descent for carrying off by gutters the waste wash from the stills and the water which has become hot, (and consequently useless) in the worm tub or refrigeratory. It is absolutely necessary, that the pump should afford a sufficiency of water to supply the still, to cool the worm, and to dilute the spirits (to a certain degree) after distillation. The still, if of a middling size, should be placed upon a furnace of brick work, having a fire-place 24 inches long, 9 inches wide, and 22 inches high.

Let the still-cock come so far through the brick work, that the wash may run out, either into cans or otherwise, as there is convemency for conveying it away. The brick work about the still must be exactly round, as high as the upper nails of the still, (sloping from the flame lest any liquor boil over,) and well mortared; also covered all round with coarse

canvas or hop-sack, to keep the wall from cracking.

The worm tub must be placed very near the still, upon a strong wooden frame according to its size, which must be six or eight times the capacity of the still, so that every stave may rest firmly upon the frame; the better to support the great weight of such a quantity of water, as is necessary for keeping the worm constantly cold. The worm-tub-frame must be so high, that when the tub is placed upon it, the low end of the worm which comes through the the tub, will admit of the cans being readily placed under, and taken away when they are full. The upper end of the worm must be placed so, that the arm of the still head may go into it without any difficulty, and shut so close as to be easily luted; and the tub must stand so upright, that no liquor may remain in the worm, this may be known by putting a pint or quart of water into the worm which will run out at the lower end of it. In the middle of the worm tub, place a wooden gutter three or four inches square within, to reach from the tob to the bottom, having about three or four inches on the opposite sides, at the bottom end of it, left open; so that the cold water pumped into the gutter, may flow out at the two breaches to the lower part of the worm tub.—This will force all the hot water to ascend and run either over the worm-tub, or through a waste pipe soldered in the tub, and extending down the sides to convey it away. The pump must be placed next the worm-tub, and must be of such a height that the spout, or cock, may reach the gutter fixed in the middle; so that the water may be more easily, and with

less waste, conveyed into the tub to cool the worm. There should, also, be another spout or cock in the pump, rather lower, for drawing water for all common uses; the higher spout being closed, and only appropriated for cooling.

It will be likewise necessary to have a large back, set upon a strong frame, to command the worm-tub, and to contain a large quantity of water, having a large brass cock communicating with the still, &c. This will be of very great service on any emergency; and may be drawn off in much less time, and with less trouble, than by pumping; for the still may accidentally be dry, which would be productive of danger if there were not a quantity of water ready at hand. It will be convenient to have a middle sized press, fixed firmly in a corner of the distillery. It should have a strong bed to contain the articles to be pressed. There should also be six hair cloths somewhat wider than the press, to be put between the layers of cherries, elderberries, raspberries, &c., to be acted on. The fruit should be placed in thin layers; the juice will run off by a spout affixed to the press, into one of the cans placed under it.

In a distillery, are required a variety of utensils, such as three or four iron bound tubs, capable of containing from a hogshead to a pipe of any liquor; three or four cans, capable of holding from two to six gallons by measure; these should have brass or other marks in their necks, to which they should be filled; the marks are intended to determine the quantity of liquor. Another necessary utensil, is an iron-bound wooden funnel, which by computation will hold three or four gallons, having a strong iron

nosel, or pipe, to put into the bung holes of the casks.

In some convenient part of the distillery must be placed a pretty large vessel, either covered or open, with a cock in it in which all afterrunnings, washings of casks, drippings of the cocks, and goods accidentally spoiled, either by wrong mixture, or otherwise; may be kept.

The contents, when in sufficient quantity, may at any time be put into the still and purified,

Another necessary utensil, is a strong copper or tin pump, five feet long and six inches in circumference; its nosel about six inches from the top of the pump, and about fourteen inches long. The use of this pump, with its appurtenances, is to draw the spirits out of the pieces, into the cans, to charge the still with; and for many similar purposes. A pewter syphon is likewise requisite; it should be made somewhat semilunar, about six feet and a half long, and four inches in circumference. This instrument is employed to draw spirits from any vessel, where the pump cannot play. Flannel bags are very necessary in a distillery, for refining the thick and feculent matter, at the bottom of casks, and other vessels. These bags are each made of a yard of coarse flannel, sloped so as to have their bottoms narrow, and their tops as wide as the flannel will admit. In shape they resemble inverted cones. They are to be well sewed up at the sides; and their upper parts; are to be folded round wooden hoops and well fastened to them. The hoops being perforated in several places, may be suspended by cords from the ceiling. Lutes, whereby the joints of a distilling apparatus, may

be so closed as to prevent the escape of the spirits, are made of common clay with carbonate of lime and water. When the still is charged, let the fire under it be lighted; and whilst it burns up, the joints should be carefully luted. The fire should be of coals, which give a more uniform and lasting heat than wood.—In Scotland, peat, or turf, is used for this purpose; and it is said, that the spirits distilled by such fires, possess a peculiar flavour arising from this practice.

By laying the hand on the still and capital, as the fire gains strength, the process of the operation will be ascertained; for whenever the head or capital, feels hot, it is a proof that the volatile particles have arisen, and are about to enter the worm. When the still head is about to become hot, prepare a *damp* made of the ashes under the grate, mixed with as much water as will properly wet them. This mixture is to be thrown upon the fire, to moderate its action, at the instant when the distillation has commenced. By this precaution, the violence of the fire will be abated; otherwise, the spirits would come through the worm, in a rushing stream, and very foul; whereas, it should be quite limpid, and of the size of a goosequill. When one or two cans have been filled with the spirit from the worm's end, there is little danger from the fire, which may now be permitted to burn bright and strong. Continue the heat as long as the distilled liquor is spirituous to the taste. It must be recollected, however, that the whole of the distilled liquid is not of the same quality; that which comes over first, being more strongly impregnated with alcohol, than that which runs off towards the conclusion of the process. These are of course

to be kept separate. The weak when in sufficient quantity, may be re-distilled alone, or it may be put into the still with the next charge. When the distilled liquor carries with it any particular flavour it should be redistilled with essential oils, in order to convert it into a compound spirit, as gin, peppermint, and other cordials.

When all the spirituous fluid is drawn off, the still should be emptied by a cock in the side. The head, &c. should then be removed, and the several lutes taken clean off. The still may now be charged a second time and luted; and hen the process is to be carried on as before. If the spirits or compound to be made, is of a different nature, or flavour, from that procured from the last distillation, the still, capital, and worm, should be thoroughly cleaned by hot water, sand and a scrubbing-brush, to remove the oily particles which adhere to their internal surfaces. The worm is best cleaned by passing hot water thro' it repeatedly, until the water flows out quite flavourless.

It conduces much to the good quality of the compound spirits, when the ingredients of which they are composed, are infused in spirits all night, before distillation. Let all these be bruised, sliced, or otherwise separated before infusion.

Great care should be taken that no grease, tallow, soap, or any other unctuous matter fall into the tubs, pieces, rundlets, or cans. All these will injure the appearance of the spirits, causing a flatness which prevents the rising of those bells or globules, which are characteristic of strong spirit.

Above all things, lighted candles, torches, or papers, should not be brought near any vessel contain-

ing spirits. The flue, or chimney, should be kept constantly clean, both to prevent conflagration, and to preserve the draught of the fire clear.

In dulcifying, or sweetening the spirits, weigh the sugar and dissolve it in one or more cans of the water, with which the compound is to be made up: bruise the sugar, and stir it well, till all is dissolved. Then empty it into the cask, containing the spirits; mixing all together, by drawing off several cans by the cock, and emptying them into the casks by the bung-holes. Now rummage all well together, till they are perfectly compounded.

Spirits, or compounds, that are strong, require no assistance in setting, and becoming clear; but those that are weak must be refined by the addition of some other substance. To every hogshead of Geneva, or other spirituous compound, put six ounces of powdered alum, previously dissolved in three or four gallons of the compound: stir all well together. In the course of twenty-four hours, the whole will be rendered completely clear.

It is a good practice to leave the bung-holes of casks (containing spirits or compounds newly made) open for several days: this improves their flavour, and renders them clear, sooner than they would otherwise be. It is an error, to suppose that the spirits will be injured, or weakened, by this practice, as the quantity, which, by any possibility, will evaporate from so small an aperture, is comparatively trifling with that of the whole contents of the cask.

It has been repeatedly proved that table salt, thrown into the still, in the proportion of six ounces to ten gallons of any liquid to be distilled, will greatly

improve the flavour, taste, and strength of the spirit. The viscid matter will be fixed by the salt, whilst the volatile matter ascends in a state of great purity. But some even suppose, that the quantity of alcohol, produced by the addition of salt is greater than when distilled without it; and a distiller in Copenhagen, some time since, published an account, that having several times distilled brandy and gin, from wheat steeped in salt water, he constantly obtained nearly two twenty-sevenths more of spirits, than from an equal quantity of wheat not so steeped.

The flavour of malt spirits is said to be highly improved, by putting three ounces and a half of finely powdered charcoal, and four ounces and a half of ground rice, into a quart of spirits, and letting it stand fifteen days, frequently stirring it; then let the liquor be strained, and it will be found nearly of the same flavour as brandy.

A great desideratum among distillers, in this country, is to imitate foreign spirits, such as brandy, rum, Geneva, &c. to a tolerable degree of perfection; but notwithstanding the many attempts that are daily made for this purpose, the success in general has been indifferent.

The general method of distilling brandies in France differs in nothing from that practised here with malt-wash or molasses; nor are the French distillers in the least, more cleanly in their operations. Still, though brandy is distilled from wine, experience tells us, that there is a great difference in the grapes from which the wine is made. Every soil, every climate, every kind of grapes, varies with regard to the quantity and quality of the spirit distilled from them. A

large quantity of brandy is distilled in France during the time of the vintage; for the poor grapes that prove unfit for wine, are usually first gathered, pressed, their juice fermented, and instantly distilled. This rids them of their poor wines at once, and leaves their casks empty for the reception of better. It is a general rule with them, not to distil wine that will fetch any price as *wine;* for, in this state, the profits obtained are much greater, than when the wine is reduced to brandies. The large stock of small wines, with which they are almost overrun in France, sufficiently accounts for their making such vast quantities of brandy in that country, more than in others which lie in warmer climates, and are much better adapted to the production of grapes. Nor is this the only source of their brandies; all the wine that turns bad is condemned to the still; and also all that they can neither export, nor consume at home.

The Arabian physicians used brandy in the composition of medicines, but Alexander Tassoni relates that the Modenese were the first in Europe, who, on occasion of too abundant a vintage, made and sold brandy in considerable quantities. The German miners had first acquired the habit of drinking it; and the great consumption of and demand for this liquor, soon induced the Venetians to participate with the Modenese in this new branch of commerce. Brandy did not come into general use till towards the end of the fifteenth century, and even then it was called *burnt wine.* The first printed book which makes mention of brandy, recommended it as a preservative against most diseases, and as a means to prolong youth and beauty!

For a long time this liquor was distilled only from spoilt wine, and afterwards, from the dregs of beer and wine; and, when instead of these, the distillers employed rye, wheat, and barley, it was considered as a wicked and unpardonable misuse of corn: it was for a considerable period the received opinion in France, that brandy distilled from the lees of wine or the husks of grapes, was injurious to the health of those who drank of it; in consequence of which, it was forbidden to distil brandy from such ingredients, under pain of a heavy fine, and the destruction of the still, &c. The fallacy of this opinion, however, was exposed by an order of council, in July, 1784, which gave permission to make brandy both from the lees of wine and from the husks of grapes.

The French brandies are acknowledged to be the best in Europe, those of Nantes and Poitou, of which the qualities are pretty similar, are the most esteemed, as well on account of their excellent flavour, as their peculiar fineness and strength; which latter is such, that they bear the head-proof longer than any other spirituous liquor. It is of these brandies, therefore, that the greatest quantity is exported.—The brandies of Anjou, Touraine, Orleans, &c. although not exactly equal in quality to the brandies of Nantes and Poitou, are excellent. Nantes alone, annually ships from seven to eight thousand barrels of brandy, and Bordeaux nearly double that quantity.

The mode in which the merchants of the French ports, purchase their brandies, is as follows: They write to the distillers to send them samples of certain qualities of brandy, (all of which are distinguished by numbers;) the samples are accordingly for-

warded in phials; on receiving them, the merchant briskly strikes the bottom of each phial with his open hand, which causes the bubbles, or beads, to appear on the surface of the liquor. By their size, and duration, he forms his judgment of the respective strength of each sample. If the beads be small and quickly disappear, the brandy is weak; and *vice versa.*

A practice has prevailed for some time, among several of the French distillers of adulterating their brandies, to make them bear a head, by mixing with them a certain quantity of strong barley-sugar; but this gives the liquor such a degree of harshness, as cannot but be perceived, on tasting it. Genuine brandy invariably possesses a smooth vinous flavour, and does not bite the tongue in the same manner as the adulterated liquor.

BRANDY.

IMITATION OF COGNIAC BRANDY.

English spirits, with proper management, are convertible into brandy that shall hardly be distinguished from the foreign, in many respects, provided the operation is neatly performed. The best, and indeed the only method of imitating French brandies to perfection, is by an *essential oil of wine;* this being the very ingredient which gives the French brandies their flavour. It must, however, be remembered, that in order to use even this ingredient to advantage, a pure *tasteless spirit must first be produced;* for it

would be absurd to expect, that this essential oil should be able to give the agreeable flavour of French brandy to our malt spirit, already loaded with its own oil, or strongly impregnated with a lixivious taste from the alkaline salts used in rectification.

To prepare the oil of wine, dissolve some cakes of dry wine-lees in six or eight times their weight of water, distil the liquor by a slow fire, and separate the oil by a separatory glass, reserving for the nicest uses that which comes over first, the succeeding oil being coarser and more resinous. This oil of wine may be dissolved in alcohol; by which means it will, for a long time, be fully possessed of all its flavour, but otherwise it will soon grow rancid.

The essential oil, however, must be drawn from the same kind of lees as the brandy, to be imitated, was procured from: that is, in order to imitate cogniac brandy, it will be necessary to distil the essential oil from cogniac lees; and the same for any other kind of brandy. For as different brandies have different flavours, and as these flavours are entirely owing to the essential oil of the grape, it would be preposterous to endeavour to imitate the flavour of cogniac brandy with an essential oil procured from the lees of Bordeaux wine. After the flavour of the brandy is well imitated by a proper dose of the essential oil, and the whole reduced into one simple and homogenous fluid, other difficulties still remain: the colour, the proof, and the softness, must also be regarded, before a spirit that perfectly resembles brandy can be procured. With regard to the proof, it may be easily accomplished by using a spirit *rectified above proof;* this after being intimately com-

bined with the essential oil of wine, may be reduced to a proper standard by distilled water. The softness may, in a great measure, be obtained by distilling and rectifying the spirit over a gentle fire, what is wanting in this criterion, when the spirit is first made, will be supplied by time: for it must be remembered that it is time alone that gives this property to French brandies, as at first they are acrid and fiery. Treacle or burnt sugar, gives the spirit a fine colour, nearly resembling that of French brandy; but as its colour is deep, a large quantity must be used. This is not, however, attended with any bad consequences, for notwithstanding that the spirit is really weakened by this addition, yet the bubble-proof, (the general criterion of spirits,) is greatly heightened by the tenacity imparted to the liquor by the treacle. The spirit acquires from this mixture a sweetish or luscious taste, which renders it very agreeable to some palates. A much smaller quantity of burnt sugar, than of treacle, will be sufficient for colouring the same quantity of spirits: the taste is also very different; for instead of the sweetness imparted by the treacle, the spirit acquires from the burnt sugar an agreeable bitterness, and by that means, recommends itself to many who dislike a luscious spirit. The burnt spirit is prepared by dissolving a proper quantity of sugar in a little water, and scorching it over the fire till it acquires a black colour.

Observations. The spirit distilled from molasses, or treacle, is very pure. It is made from common treacle dissolved in water, and fermented in the same manner as the wash of the common malt spirit. But if some particular art is not used in distilling this

spirit, it will not prove so vinous as malt spirit, but more flat and less pungent, (though otherwise much better tasted,) as its essential oil is of a less offensive flavour. Therefore, if fresh wine lees, abounding in tartar, are well fermented in molasses, the spirit will acquire a greater vinosity and briskness, and approach much nearer to the nature of foreign brandy. If the molasses spirit brought to the common proof-strength, is found not to have sufficient vinosity, it will be proper to add some sweet spirits of nitre; and if the spirit has been properly distilled by a gentle heat, it may by this addition only, be made to pass with ordinary judges, as French brandy. Great quantities of this spirit are used in adulterating foreign brandy, rum, and arrack. Much of it is also used alone, in making cherry-brandy and other cordials by infusion; in all which, many, and perhaps with justice, prefer it to foreign brandies. Molasses, like all other spirits, is entirely colourless when first extracted; but distillers always give it, as nearly as possible, the colour of foreign spirits.

BRITISH BRANDY.

To sixty gallons of clean rectified spirits, put one pound of sweet spirit of nitre, one pound of cassia buds ground, one pound of bitter almond meal, and four pounds of figs chopped fine, (the figs, cassia and almond meal to be mixed together, before they are put to the spirits,) two ounces of sliced orris root, and about thirty or forty prune stones pounded; agitate the whole well together, two or three times a day, for three days or more; let them settle, then

pour in one gallon of the best wine vinegar, and add to every four gallons, one gallon of foreign brandy.

THE MYSTERY OF TRADE.

Judge Wrighthouse states that the great mystery of trade is, in a considerable degree, in the frauds practised; and gives the following specimen of two traders, who for a term of twenty years, sold nearly the same amount of goods, one made use of every art and skill that man was capable of, and accumulated *five hundred thousand pounds;* the other sold at fair and honourable advances, and accumulated *five thousand guineas.*

THE GREAT SOURCE OF WEALTH.

Judge Morewealth informs us, that a country trader sent a few casks of native spirits to a city trader and ordered a quantity of foreign spirits bearing the same name as the native; and that, the native spirits was taken and placed in foreign casks, and sent to the country trader, and charged him at three times the price of native spirits. For this offence, the judge says, this famous money-maker never was brought to any trial, but the trial of conscience which burnt in his latter days like the burning of Mount Vesuvius.

GIN.

PROCESS OF PREPARING GIN, IN HOLLAND.

The grist is composed of ten quarters of malt, ground considerably finer than our malt distiller's

barley grist, and three quarters of rye meal; or more frequently of ten quarters of rye, and three quarters of malt meal. The ten quarters are first mashed with the least quantity of cold water it is possible to blend it with, and when uniformly incorporated, as much boiling water is added as forms it into a thin batter; it is then put into one, two, or more casks, or gyle tuns, with a much less quantity of yeast than is usually employed by our distillers. Generally, on the third day, the Dutch distillers add the malt or rye meal, prepared in a similar manner, but not before it comes to the temperature of the fermenting wash; at the same time adding as much yeast as at first.

The principal secret is the management of the mashing part of the business, in first thoroughly mixing the malt with the cold water, and in subsequently adding the due proportion of boiling water, that it may still remain sufficiently diluted after the addition of the fine meal; also in well rousing all together in the back, that the wash may be diluted enough for distilling, without endangering its burning to the bottom of the still. Thus they commodiously reduce the business of brewing, and fermenting, to one operation. By using cold water uniformly to wet the malt, all danger of clogging is necessarily avoided. By diluting the wash thin enough to be fermented and distilled together, (by which means the spirit of the bran, and husky part, as well as of the flour of the grain, are completely extracted,) the Dutch distillers obtain more spirit from their grain than we do, and of a better quality, with not half the trouble taken by our distillers. Their stills usually contain from

three to five hundred gallons each; they constantly draw off three cans of phlegm, after the runnings cease to burn on the head of the still, when distilling wash; and five cans when distilling low wines.—This practice we are unacquainted with, as we usually draw the fire as soon as the runnings from the still burn languidly on the still-head. This and the great quantity of rye the Dutch use, renders their spirit so much more acid; and the diluteness of their wash is a very good reason for the great purity, and quantity, of their spirit.

To every twenty gallons of spirit, about the strength of proof-spirit, they add three pounds of juniper-berries, with two ounces of oil of juniper, and distil by a slow fire: this produces the best Rotterdam gin. An inferior kind is made with a less proportion of berries, sweet-fennel seeds, and strasburg-turpentine, without a drop of juniper oil. This compound, and a better sort (but inferior to the Rotterdam gin,) are made at Weesoppe.

Observations. In Consett's travels in Sweden, we are informed that grain is not the only ingredient used in that country for the distillation of spirits. He says, "The low priced brandies, and gin, are made from rye, and *ants*, a species of insect very plentiful in this country. Upon inquiry, I find that these ants supply a resin, an oil, and an acid, which have been deemed of considerable service in the art of physic. The ant, used upon these occasions, is a remarkably large black insect, commonly found in small round hillocks, at the bottom of the fir tree. It is less to be wondered, that they should use these insects in their distilleries, than that they should eat them, and consider them as highly palatable and pleasant."

RUM.

DISTILLATION OF RUM IN THE WEST INDIES.

In the still house, as well as in the boiling house, the greatest cleanliness is necessary; the vats, (at the beginning of the harvest,) ought to be well washed out, with both warm and cold water, to divest them of any filth which may have adhered to their bottoms and sides, since they were last in use.

At first, a greater proportion of skimming from the sugar-pans must be used, than will afterwards be necessary, as the distiller has no good lees, and very little molasses to add to the mass; besides, the skimmings, at the commencement of the season, are not so rich as they will be in March, April, and May, which are esteemed the best yielding months. The following proportions will succeed well in the beginning: for every hundred gallons the vat contains, put forty-five gallons of skimmings, and five of molasses, to fifty gallons of water. When there are good lees, (or returns, as they are commonly called,) mix equal quantities of skimmings, lees, and water, and for every hundred gallons, add ten gallons of molasses. When the mill is going, and therefore, when there are no skimmings, mix equal parts of lees, and water, and for every hundred gallons add twenty gallons of molasses. From liquor set in these proportions, the distiller may expect to obtain from ten to fifteen per cent. of proof rum and other products.—But the quantity of spirit will depend greatly on the quality of the ingredients, and in some measure on the weather; therefore an intelligent distiller will vary his proportions accordingly.

Rum differs from what we simply call sugar spirit, as it contains more of the natural flavour, or essential oil, of the sugar-cane; hence it is generally thought, that the rum derives its flavour from the cane itself.

When a sufficient stock of materials are got together, the West India distillers add water to them, and ferment them in the common method. The fermentation, however, is always carried on very slowly at first, because at the beginning of the season for making rum in the islands, the distillers want yeast to make it work; but after this, they by degrees procure a sufficient quantity of the ferment, which arises up as a head to the liquor in the operation; and thus they are able afterwards to ferment, and make their rum with a great deal of expedition, and in very large quantities.

When the wash is fully fermented, the distillation is carried on in the common way, and the spirit is made up proof, though sometimes it is brought to a much greater degree of strength, nearly approaching to that of alcohol. It is then called double distilled rum.

Observations. It would be easy to bring the spirit to a much greater degree of strength than we usually find it, if it did not bring over in the distillation so large a quantity of a gross oily matter, which is often so disagreeable, that the rum must be suffered to lie by a long time, to become mellow, before it can be used.

The best state to keep rum, both for exportation and other uses, is doubtless in that of alcohol, or ardent spirits. In this manner, it would be contained in half the bulk it usually is, and might be let down

to the common proof strength with water, when necessary.

What is termed sugar spirit, is extracted from the washings, skimmings, dross, and waste of the boiling house. These are to be diluted with water, fermented in the same manner as molasses or wash, and then distilled in the common method. If the operation be carefully performed, and the spirit well rectified, it may be mixed with brandies, in large proportion, to great advantage; for this spirit will be found superior to that extracted from treacle, and consequently more proper for these uses. In Barbadoes, a very good spirit of this kind is prepared from the cane juice, called cane spirit, resembling very pure rum.

IMITATION OF JAMAICA RUM.

To imitate Jamaica rum, it is necessary to procure some of the tops, or other parts of the sugar canes, and to put them in a still, in the proportion of a pound weight to two gallons of pure flavourless spirit, and one gallon of pure water. The distillation may be carried on by a brisk heat, provided there is a quantity of common salt, (in the proportion of an ounce to each gallon of liquid in the still,) to prevent the mucilaginous matter from arising with the spirit.

The product when rectified and coloured by burnt sugar, will possess every character of excellent rum.

WHISKEY.

SPIRITS DISTILLED FROM CARROTS.

In France, spirits have been largely distilled from

the fermented juice of the potatoe, and potatoe apple, and in England from carrots.

Of the experiments with the latter vegetable substance, Dr. Hunter of York, who performed them has given us the following interesting account.—

"I took one ton and eight stone of carrots, which, after being exposed a few days to dry, weighed one hundred and sixty stone. After being washed, topped, and tailed, they lost in weight eleven stone.—The whole being cut, I put one-third of the quantity into a copper, with twenty four gallons of water, and after covering them up close, the fire was lighted underneath, which in three hours reduced the whole into a pulp. The other two-thirds was treated in the same manner, and as the pulp was taken from the copper, it was carried to the press, where the juice was extracted with great facility. The liquor obtained amounted to two hundred gallons, and was of a sweet rich taste, resembling wort. It was then put into the copper with one pound of hops. It was suffered to boil about five hours, when it was put into the cooler. Here it remained till the heat came down to 66 degrees. From the cooler it was discharged into the vat, where six quarts of yeast were put to it, in the usual manner. It continued to work forty eight hours, during which time the heat gradually decreased, contrary to what is observed in other liquors during fermentation. At this time it was at 58°, when the yeast began to fall. I then heated twelve gallons of unfermented juice, and putting it to the liquor, the heat was raised to 66°; it worked afresh for twenty four hours longer, the liquor gradually lowering, as before, from 66° to 58°. The yeast

now beginning to fall, the whole was turned into half-hogsheads, where it continued to work from the bung. During the progress of the fermentation, the air in the brewhouse was 46° and 44°. As the liquor in the vat seemed to lose heat hourly, instead of gaining it, I thought proper to keep a fire in the place, during the whole time of the fermentation. After standing three days in the casks, the liquor was thrown into the still, and fifty gallons drawn off. This was rectified the next day, without any additional substance, and twelve gallons of spirit were obtained."

Observations. "The refuse of the carrots weighed forty eight stone, which added to the tops and tails made provision for the hogs. To this should be added the wash from the still, which measured about 114 gallons. In this instance, the *refuse* of an acre of carrots, greatly exceeds that of an acre of barley, which is a valuable consideration where hogs are kept. By my experiment, an acre of carrots, (20 tons) will produce 240 gallons of spirit. This is considerably more than what can be obtained from five quarters of barley, which I consider as an equal produce. I estimate the cultivation of an acre of carrots at $45; in which sum I include rent, ploughing, weeding, and all expenses: and as far as I am able to guess, the expense of fermentation and distillation will amount to about $67 more. So that estimating the spirit at seventy seven cents per gallon, the profit will be $72,80 per acre, to be divided between the grower and manufacturer, exclusive of what is produced by the refuse, which, in large distilleries, would make a considerable part of the profit."

CORDIALS.

USQUEBAUGH.

Usquebaugh is a very celebrated cordial. There are different ways of making it, but the following is the most preferable.

Take of nutmegs, cloves, and cinnamon, each two ounces; of the seeds of anise, carraway, and coriander, each four ounces; liquorice root, sliced, half a pound; bruise the seeds and spices, and put them together with the liquorice into the still, with eleven gallons of proof spirits, and two gallons of water; distil with a pretty brisk fire. As soon as the still begins to work, fasten to the nosel of the worm two ounces of English saffron, tied up in a cloth, that the liquor may run through it, and extract all its tincture. When the operation is finished, sweeten with fine sugar.

Observations. This cordial may be much improved by the following additions. Digest four pounds of stoned raisins, three pounds of dates, and two pounds of sliced liquorice root, in two gallons of water, for twelve hours. When the liquor is strained off, and has deposited all sediment, decant it gently into the vessel containing the usquebaugh.

LAVENDER SPIRIT.

Take fourteen pounds of lavender flowers, ten gallons and a half of rectified spirits of wine, and one gallon of water; draw off ten gallons by a gentle fire; or, which is much better, by a sand-bath heat.

Observations. To convert this into the red liquid known by the name of compound lavender spirit:—Take of lavender spirit above described, two gallons; of Hungary water, one gallon; cinnamon, and nutmegs, of each three ounces; and of red saunders, one ounce; digest the whole for three days in a gentle heat, and then filter it for use. Some add saffron, musk, and ambergris, of each half a scruple; but those are now generally omitted.

HUNGARY WATER.

Take of the flowery top, with the leaves and flowers of rosemary, fourteen pounds; rectified spirit, eleven gallons and a half; water, one gallon; distil off ten gallons by a moderate fire.

Observations. This is called Hungary water, from its being first made for a princess of that kingdom. Some add lavendar flowers, and others florentine orris root; but what is most esteemed, is made with rosemary only.

CINNAMON CORDIAL.

Take eight pounds of fine cinnamon bruised, seventeen gallons of clear rectified spirit, and two gallons of water; put them into the still, and digest them twenty four hours by a gentle heat; after which, draw off sixteen gallons by a pretty strong heat.

Observation. The proportion of ingredients and products in this, and the foregoing operations, may be reduced to any desired point.

COCCUS CACTI.—COCHINEAL.

Cochineal is a small, irregular roundish body, of a dark red colour on the outside, and a deep bright red within. It consists of an insect which derives its nourishment from the leaves of the *cactus cochinillifer*, or, as it is differently called, *nopal*, or *nopelleca*. This plant is found most abundantly in Mexico, and other parts of New Spain; and from its leaves cochineal insects are collected, and killed either by being immersed in hot water, or put into an oven moderately heated, or more advantageously, by being exposed to the scorching rays of the sun. These singular insects, in their successive generations, are taken by the Mexicans three times in a year, carefully preserving over the winter, in their houses, such as may be necessary for breeders, while attached to the succulent leaves of the plant. No less than 800,000 pounds, each pound containing at least 70,000 insects, are imported annually into Europe, as a highly valuble colouring drug. They are principally consumed by the scarlet dyers, and for the purpose of making carmine. The best sort has been sold for one guinea the pound. It is remarkable that the dried insect may be kept unimpaired for an indefinite length of time.

The true cochineal has been found in South Carolina, and Mr. K. Peal, of Philadelphia, asserts that he has discovered it upon the island of Little St. Simons, on the coast of Georgia.

It is extremely desireable that the insect, and the cactus cochenillifer plant on which it breeds, should

be cultivated in the southern states. The planter might find it a valuable source of revenue, when, from vicissitudes in the season, their crops of rice or cotton should fail.

Cochineal is not employed in medicine, except for the purpose of imparting a beautiful red colour to some tinctures. Their colour is easily extracted, both by alcohol and water.

"*Cochineal* flourishes on the native nopal, or prickly pear of South Carolina. The insect thrives well, and increases and spreads on every leaf rapidly.

"The breeding of cochineal is, however, attended with precarious circumstances, the insect is exposed to a variety of dangers from the violence of the winds, the rains, fogs, frosts, and other causes, and also from the depredations of birds, who are very fond of these insects."

VINEGAR.

ACETOUS FERMENTATION.

The acetous fermentation is that which takes place in vegetable infusions containing saccharine or mucilaginous matter at an elevated temperature. It has been shown before, that the vinous fermentation takes place at different temperatures, between 50° and 70° Farenheit; but, if saccharine or mucilaginous liquids are elevated to higher temperatures, a change takes place in the whole mass; and instead of the formation of alcohol, the generation of acetic acid, or vinegar is induced. This fermentation or acetification is, no doubt, the consequence of a chem-

ical change which takes place in the mucilaginous or saccharine principle of the vegetable substance; but upon what play of affinities it depends, chemists have not hitherto determined.

A notable difference exists between the vinegars made from different substances. The specific gravity of good wine vinegar is about 1,025, water being 1000. Wine vinegar not only contains acetous acid, but also sulphate of potass, and lime; (probably accidental,) extractive matter, and the tartaric, citric, malic, and oxalic acids. The three latter, however, are often wanting even in good vinegar. The best wines, as those of Languedoc, Spain, Portugal, and Italy, yield the strongest vinegar, although too dear for common use.

Various experiments have been tried on the acetification of certain substances. We shall here notice some performed by M. Cadet, and other French chemists.

FLOUR AND WATER WITH YEAST.

Seven ounces of flour boiled in fifty six ounces of water, assisted by half an ounce of ferment, and kept working for twenty four hours, produced as much vinegar as saturated nine drams of potass.

Observations. The same quantity of starch, boiled with a similar proportion of water and ferment, kept working for thirty five days, produced as much vinegar as saturated eleven drams of potass. Although sugar, assisted by yeast, passes from the alcoholic to acetous fermentation, yet the mixture of alcohol with water does not ferment, unless extractive matter, mucilage, or boiled starch is added, and

the alcohol is not too predominant in the mixture. A solution of sugar candy did not ferment until one fifteenth of its weight of yeast was added, and then it fermented readily in the temperature of 68° Farenheit. Treacle ferments of itself, provided it is diluted in a sufficient quantity of water. Solution of gum began to become acid very quickly, and its fermentation was promoted by yeast. Extractive matter does not ferment, but becomes putrid. Yeast produces no effect on extract of liquorice, which seems to contain a saccharine principle. Starch does not ferment by itself; flour ferments with difficulty, and after three or four days the liquid begins to putrefy.

SUGAR AND WATER WITH YEAST.

Ten ounces of sugar, seventy ounces of water, and sixteen drams of ferment, began to work the next day, the fermentation lasted twelve days. It required a dram and a half of potass to saturate four ounces of this vinegar. Eight ounces of the vinegar yielded two drams of crystalized sugar.

SUGAR, ALCOHOL AND WATER, WITH YEAST.

Five ounces of sugar, five ounces of alcohol, and seventy two ounces of water, with six drams of yeast, began to work the same day; the fermentation lasted twelve days. It required one dram of potass to saturate four ounces of this vinegar. Eight ounces of the vinegar yielded half a dram of sugar; it tasted very weak, and yielded alcohol on distillation, with some traces of acetous ether.

EXCESS OF SUGAR AND WATER.

Fifteen ounces of sugar, seventy ounces of water

and six drams of yeast, began to work the same day; the fermentation lasted twenty three days. It required two drams of potass to saturate four ounces of this vinegar. Eight ounces of it yielded nearly an ounce of sugar.

SUGAR AND WATER WITH ALCOHOL.

IN SMALL PROPORTION.

Ten ounces of sugar, five ounces of alcohol, seventy two ounces of water, and six drams of ferment, began to work the second day, and continued to do so for eight days. Carbonic acid gas was emitted, but the liquor did not redden syrup of violets. By distillation each quart of vinegar yielded ten drams of weak alcohol.

SUGAR, GUM, AND WATER, WITH YEAST.

Eight ounces of sugar, two ounces of gum, seventy two ounces of water, and six drams of ferment, began to work the first day; the fermentation lasted fifteen days. It required two drams of potass to saturate four ounces of this vinegar. The vinegar was very strong, and alcohol being poured in, nearly an ounce of mucilage was precipitated in a month afterwards.

SUGAR AND WATER, WITH EXCESS OF YEAST.

Fifteen ounces of sugar, seventy-two ounces of water, and ten drams of yeast, began to work the first day; the fermentation lasted ten days. It required two drams of potass to saturate four ounces of this vinegar. The same quantity yielded two drams of sugar which had not fermented.

Observations. From these experiments it may be concluded: 1st. That the alcohol added to the fermenting liquors (although it may be partly changed into vinegar,) cannot be substituted for sugar. 2d. That when the sugar is in too great quantity, part of it does not ferment. 3d. That mucilage hastens the fermentation, but, like sugar, the superabundant portion remains unaltered. And 4th. That too large a proportion of alcohol prevents fermentation altogether.

M. Cadet tried several experiments, to determine the best proportions of ingredients, to form vinegar. He found the following to be those best adapted to this purpose.

APPROVED PROPORTIONS OF INGREDIENTS, FOR THE BEST VINEGAR.

Eight ounces of sugar, fifty seven ounces of water, and four drams of yeast, began to work the first day; the fermentation lasted twelve days. It required three drams of potass to saturate four ounces of the vinegar produced. This vinegar was very strong, agreeably tasted, and did not contain or deposit any sugar.

DIMINUTION OF THE ABOVE QUANTITY OF WATER.

By diminishing the quantity of water, some of the sugar remains undecomposed. Seven ounces and one dram of sugar, twenty eight ounces of water, and four drams of yeast, did not begin to work till two days afterwards; the fermentation lasted twenty one days, being very slow. It required only two drams of potass to saturate four ounces of this vinegar.

The liquor was still very saccharine, and tasted like simple oxymel.

APPROVED PROPORTIONS FOR THE CONVERSION OF ALCOHOL INTO VINEGAR.

The following proportions appeared most likely to cause alcohol to be totally converted into vinegar. Three ounces and four drams of sugar, the same quantity of alcohol, twenty eight ounces of water, and four drams of ferment, began to work two days afterwards; the fermentation lasted seventeen days. It required two drams of potass to saturate four ounces of this vinegar; the liquor had a vinous smell, and half the alcohol employed was separated by distillation.

Observations. Sugar, therefore, is the essential ingredient in the formation of vinegar; mucilage is partly changed into vinegar, and accelerates the fermentation, but disposes the liquor to putrefaction, unless prevented by the addition of alcohol. This last is imperfectly changed into vinegar; but it renders the vinegar sharp, makes it keep well, and when used for infusing aromatic plants, takes up the resinous odoriferous particles.

Mr. Herbert of Berlin, is said to have made vinegar, in two months, from four parts of rectified malt spirits, and seventy two of water; but this experiment did not succeed in France. The vinegar commonly sold, contains alcohol, and the first portion that comes over is alcoholic. M. Lowitz has separated alcohol from vinegar by freezing, and subsequent distillation from powdered charcoal. The quantity of potass required to saturate a given quan-

tity of vinegar, indicates the quantity of acid which it contains, and the quantity of acid appears to depend upon the quantity of sugar originally contained in the fermented mass. Hence taking the first experiment of eight ounces of sugar for the basis of the calculation, it appears that the sugar employed in the formation of acetous acid, is to the potass necessary to saturate it, as 1.2668 to 1.0000; from whence there may be calculated the quantity of sugar that ought to be added to any weak vinegar, in order to bring it to any required strength. The same experiment also shows that one hundred parts of good vinegar are formed from 12.410 of sugar, 0.799 of yeast, and 86.791 of water, whence the proportion of yeast to be added may be deduced; and on this foundation an estimate may be made of the quantity of saccharine matter contained in a vegetable, when it is so enveloped in other principles, as not to be separable by the ordinary methods. This may be performed by making a decoction of the plant, fermenting the decoction, and saturating the acid with potass. If the decoction reddens litmus; the malic, citric, oxalic, or tartarous acid, contained in it, must be saturated with lime, and the liquor filtered before fermentation.

Vinegar may be made in all places by properly adjusting the quantities of saccharine matter, water, and ferment.

Excellent vinegar has been made from cabbage, with the addition of some brandy and sugar. Alcohol may be employed in lieu of some of the sugar, provided it does not exceed the fourth part of this substance. The quantity of sugar that the substance

contains ought to be previously ascertained, by fermenting eight ounces of it with fifty six ounces of water, and half an ounce of yeast or baker's leaven, which latter is preferable, because yeast sometimes gives a disagreeable taste to the vinegar. The mixture is to be put into a vessel, one half of which is to be left empty, and kept in a temperature of 68° Farenheit, for twenty five or thirty days, being stirred morning and evening. The strength of the vinegar, now obtained, being ascertained by adding potass. it will be easy to calculate how much saccharine matter must be added, to form vinegar of the required strength. In large manufactories it is best to employ small barrels, placed as in saltpetre houses, in order that their contents may be easily drawn off, and no brass cocks or pewter syphons should be used. The barrels should all be placed in a stove, so that all may receive an equal degree of heat, regulated by thermometers placed in different parts of the building.

COMMON METHOD OF MAKING VINEGAR.

To every gallon of water put a pound of coarse Lisbon sugar; let the mixture be boiled, and skimmed as long as any scum arises. Then let it be poured into proper vessels; and when it is as cool as beer when worked, let a warm toast rubbed over with yeast be put to it. Let it work about twenty four hours, and then put it into an iron hooped cask, fixed either near a constant fire, or where the summer sun shines the greater part of the day; in this situation it should not be closely stopped up, but a tile, or something similar, should be laid on the bung

hole to keep out the dust and insects. At the end of about three months, (something less,) it will be clear, and fit for use, and may be bottled off. The longer it is kept, after it is bottled, the better it will be. If the vessel containing the liquor is to be exposed to the sun's heat, the best time to commence making it, is the month of April.

GOOSEBERRY VINEGAR.

Bruise the gooseberries when ripe, and to every quart put three quarts of water; stir them well together, and let the whole stand for twenty four hours, then strain it through a canvas bag.

To every gallon of liquor, add one pound of brown sugar, and stir them well together before they are put into the cask. Proceed in all other respects as before. This vinegar possesses a pleasant taste and smell; but raspberry vinegar, which may be made on the same plan, is far superior in these respects. The raspberries are not required to be of the best sort, still, they should be ripe, and well flavoured.

PRIMROSE VINEGAR.

To fifteen quarts of water put six pounds of brown sugar; let it boil ten minutes, and take off the scum; pour on it half a peck of primroses; before it is quite cold, put in a little fresh yeast, and let it work in a warm place all night; put it in a barrel in the kitchen, and when done working, close the barrel, still keeping it in a warm place.

VINEGAR FROM THE REFUSE OF BEE-HIVES.

When honey is extracted from the combs, by means of pressure, take the whole mass, break and separate it, and into each tub or vessel, put one part of combs, and two of water; place them in the sun, or in a warm place, and cover them with cloths. Fermentation takes place in a few days, and continues from eight to twelve days, according to the higher or lower temperature of the situation in which the operation is carried on. During the fermentation, stir the matter from time to time, and press it down with the hands, that it may be perfectly soaked. When the fermentation is over, put the matter to drain upon sieves or strainers. At the bottom of the vessels will be found a yellow liquor, which must be thrown away, because it would soon contract a disagreeable smell, which it would communicate to the vinegar. Then wash the tubs, put into them the water, separated from the other matter; it immediately begins to turn sour, when the tubs must be again covered with cloths, and kept moderately warm. A pellicle, or skin, is formed on the surface, beneath which the vinegar acquires strength; in a month's time it begins to be sharp; it must be left standing a little longer, and then put into a cask, of which the bung hole is left open. It may then be used like any other vinegar.

Observations. To strengthen vinegar, suffer it to be repeatedly frozen, and separate the upper cake of ice, or water, from it.

All vinegars owe their principal strength to the acetic acid they contain; but the vinegar of wine contains also tartar, a small portion of the malic acid,

alcohol, and colouring matter; that of cider and perry contains merely malic acid, little or no alcohol, and a yellowish colouring matter.

BREAD.

PANARY FERMENTATION.

This species of fermentation, (which has been termed panary, from the latin, *panis*, bread,) is that which is induced in a mixture of flour and water by yeast, in the making of bread. Bread, which has undergone this fermentation, is termed leavened bread, to distinguish it from that in which there has been no chemical change. Sea biscuits, and other hard bread of similar nature, also that used by the Jews at the time of their passover, come under the denomination of unleavened bread, whilst that prepared by the bakers for common use, is denominated leavened or loaf bread, from being prepared with yeast.

The addition of yeast to flour and water in making bread, is, doubtless, the cause of improving it greatly; for without it, this article of food would be hard, heavy, and indigestible.

Although the fermentation of dough has been termed *panary*, there is little doubt but it is merely a modification of the acetous. The subjects of both species of fermentation are certainly different, in regard to consistency, but it is probable that the modification alluded to, is the consequence of this difference: for, the fermentible matter, from want of room

for action, does not arrive at the same point of chemical change, which it would do in a more diluted state. We shall not attempt to theorize on the changes which take place during the panary fermentation, further than to suppose that flour, yeast, and water, give out their elementary components for the formation of saccharine matter, starch, carbonic acid, and acetic acid; and that during the incipient generation of the latter, the process is stopped by the action of the artificial heat. The loaf retains its shape and bulk, from the innumerable cells formed in it by the carbonic acid. The walls of these cells being suddenly hardened by the heat, (the carbonic acid being doubtless driven off,) they retain their shape and the loaf thus remains spongy. It sometimes happens, from various causes, but especially from cold, that the fermentation is checked; when this is the case, the dough is technically said to *set;* and the consequence is, that when baked, the bread is disagreeable, heavy, and unwholesome. To prevent *setting*, bakers in winter give the dough a sufficient temperature, by shutting the doors to prevent the admission of cold air, and by placing the leaven near the door of the oven.*

* Carbonic acid gas is very hurtful to the constitution. It is to be feared, that in bake houses, this gas is more plentifully inhaled than is either necessary or proper. It is well known, that, in order to be able to supply the public with fresh bread for breakfast, bakers are in the habit of working all night. About eleven o'clock at night, they make the *sponge* or dough, which, of course, must have sometime for fermentation; whilst this is taking place, the baker, who has perhaps slept little during the day, indulges himself now; and as he is fearful of not awaking in time to work the sponge into loaves, and of baking it in the oven; he hits upon the following ingenious, but pernicious expedient. He knows that the dough in the trough is every minute becoming more spongy, from the incessant action of the ferment. This enlargement of bulk will, of course, raise or resist any weight placed

Leavened bread is chiefly made from wheaten flour, of various degrees of fineness, though potatoes and rice flour are frequently, and with advantage, used in its preparation. In London the quantity of potatoes used in the best baker's bread, is from ten to fifteen pounds to every sack of flour; (a sack is three bushels.) The finest flour is seldom, or never used in making loaf bread; it is always employed in making biscuits and pastry. The coarser sorts therefore being made into loaves, there are two kinds with which the public are supplied; these are *standard* wheaten, and brown, or *household* wheaten bread. The latter consisting of all the constituents of the wheat, is considered the most wholesome, when the grain has been good from which the flour was ground. It is this bread which is generally used among the English farmers. Each pound of the flour, used in its preparation, consists of ten ounces and six drams of starch, four ounces of bran, one ounce of gluten, and two drams of sugar. The same proportion of ingredients does not, of course, exist in those sorts of wheaten flour from which the bran, &c., has been separated.

But, as the fine, or the whitest flour, is that which fetches the highest price, and as people generally imagine that the whitest loaf contains the greatest

upon the dough; consequently the lid of the trough, and any weight laid upon it, will be elevated, when the fermentation has arrived at that point, at which it may be divided into loaves. The baker, therefore, considering a similar elevation of his own body as a sufficient check on somnolency, lays himself down to sleep upon the lid of the trough; the consequence is, that he is certainly aroused from his unhealthy slumbers at the required period; but his constitution is sure to suffer from the immense body of carbonic acid gas which is liberated during the fermentation.

quantity of nutritive matter, it has always been an object with bakers, to render the coarsest flour white enough to be used in making the standard wheaten bread. But for this purpose, the most unjustifiable means have been used: regarding the use of potatoes and rice, there can be no possible blame attached to them; but when plaister of Paris, chalk, and alum, are resorted to, the trade of a baker may be justly denominated one that is injurious to society. Besides the occasional use of the two former mineral substances, it is here confidently asserted, that each inhabitant of London, generally at every meal, swallows twenty two grains of alum,* in the bread which he eats. There are some cases, where even more alum than the quantity here specified enters into the composition of bread.

* This assertion is not made without proper evidence. In addition to other undoubted authorities, a tradesman who deals in salt, alum, &c., and who is in the habit of furnishing bakers with these articles, informed the author, that he supplies each of his customers, every night, with two pounds of alum, and six pounds of common salt. These quantities they use for each sack of flour. The employment of salt in bread is attended with great advantages to health, but that of alum is truly pernicious: and what is worse, it yet remains to be proved, whether even the very appearance of bread (as to colour) is improved by the use of this astringent salt. Even bakers themselves acknowledge that it hinders fermentation, by *killing the yeast*. They say, likewise, that to counteract its effects, they use the potatoes; that is, to promote the fermentation which has been checked by alum. But, in order to demonstrate that the quantity of alum, above specified, is actually swallowed by bread-eaters, we need only reduce the two pounds of alum to grains; and supposing that a quartern loaf is eaten (at an average) at eight meals, first, multiply the number of quartern loaves produced from a sack of flour, by eight; and, secondly, divide the number of grains of alum by the product, thus:—A sack of flour generally produces eighty six quartern loaves; which, multiplied by eight meals, produces 688 portions:—two pounds of alum being multiplied by 16, become 32 ounces; these multiplied by 8, become 256 drams; and this product again multiplied by 60, is con-

PREPARATION OF BREAD

ACCORDING TO THE METHOD PRACTISED BY THE LONDON BAKERS.

A sack of flour being sifted into the kneading trough, to make it lie loose; six pounds of salt, and two pounds of alum, are separately dissolved in hot water, and the whole (in the quantity of a pailful,) being cooled to about 90° Farenheit, is mixed with two quarts of yeast. When this mixture has been well stirred, it is strained through a cloth or sieve, and is then poured into a cavity made in the flour. The whole is now mixed up into a dough, and a small quantity of flour being sprinkled over it, it is covered up with cloths, and the trough lid is shut down, the better to retain the heat. The fermentation now goes on, and the mass becomes enlarged in bulk. In the course of two or three hours, another pailful of warm water is well mixed with the sponge, and it is again covered up for about four hours. At the end of this time, it is to be kneaded for more than an hour, with three pailsful of warm water. It is now returned to the trough in pieces, sprinkled with dry flour, and at the end of four hours more, it is again kneaded for half an hour, and divided into quartern and half quartern loaves. The weight of a quartern loaf, before baking, should be four pounds and fifteen

vertible into 15,360 grains. If, then, we divide the latter of these numbers by the former, the quotient will be 22 and a fraction, thus :—

688)15360(22 14-43 grains of alum in the composition of an eighth part of a quartern loaf.
1376

1600
1376

16)224(14
16

688 43

ounces; after baking four pounds and six ounces avoirdupois. When the dough has received its proper shape for loaves, it is put into the oven, (the heat of which is about 450° Farenheit, or that which will scorch flour without burning,) where it is baked two and a half, or three hours.

PREPARATION OF HOUSEHOLD BREAD.

Four ounces of salt are dissolved in three quarts of water, and mixed with a pint of yeast. This mixture is poured into a cavity made in a peck of coarse or second flour, placed in a trough. When properly kneaded and fermented, it is divided into pieces of a certain weight, and baked in an oven.

Observation. Sometimes a portion of rice flour, or boiled potatoes, or rye meal, is mixed with the flour, in the farm houses, previous to kneading the dough. The rye and rice serve to *bind* the bread, but the potatoes render it light and spongy.

METHOD OF PRODUCING ONE THIRD MORE BREAD, FROM A GIVEN QUANTITY OF WHEAT.

Boil a bushel of the coarsest bran for about an hour, in six or seven gallons of water, (keeping it well stirred that it may not stick to the bottom of the copper,) then pour off the whole into a trough, or tub, perforated full of holes; over which may be laid a coarse cloth, to act as a sieve, on the top of the whole, should be placed a wooden cover, having a heavy weight placed thereon, to press out all the liquor from the bran; which will then be left at the bottom of the tub, in a thick pulp. The liquor that will be expressed, will contain all the essential oil of

the wheat, and will be of the consistency of paste, having a very agreeable taste and smell, similar to the milk that is found in green grain. The next thing is, to apply this liquor or mixture to the purpose of making the dough, being careful not to mix raw water therewith, as it will set the mixture. The proper quantity of bread being made, it will be found to weigh when completely baked, full one-third more than the same quantity of flour, made simply with water in the usual way.

Observations. In domestic establishments, in the country, this method is peculiarly applicable, where wheat is sent to the mill from the consumer; and it is not necessary to make any calculation, or point out the saving to the public, even by a partial adoption of this plan. Was it generally carried into effect, it would be equal to bringing six hundred thousand acres of land into the cultivation of bread corn.

BREAD MADE OF ICELAND MOSS, WITH FLOUR.

Of late years, Iceland moss has been used (either alone or mixed with flour,) in the composition of bread, in those districts where flour does not exist in plenty. The authorities of Saxony published a report on the subject, in which we are informed that seven pounds of *linchen meal* boiled with fourteen times its quantity of water, and baked in this state with fifty-nine and a half pounds of flour, produced one hundred, eleven and a half pounds of good household bread. Without this addition, the flour would not have produced more than seventy-eight and a half pounds of bread.

To prepare this bread on a smaller scale, use the following quantities.—It is known that three pounds of flour yield four pounds of household bread; one pound of linchen meal added in the form of paste, will give an addition of nearly six pounds, and therefore is equivalent, in this view, to about three and a half pounds of flour, because it affords above three and a half times more bread.

Observation. Nearly all the Iceland moss collected in Germany, is sent to England, where it is used in brewing, and in the composition of ship biscuit. Biscuit which contains it, as a constituent part, is not attacked by worms, and suffers little by the action of sea-water. This linchen, when deprived of its bitter principle, forms an excellent soup; and when coagulated, a good jelly.

LEATHER.

CONVERSION OF ANIMAL HIDES OR SKINS INTO LEATHER.

This process is what is generally termed *tanning*. It is founded on the affinity which is known to exist between the gelatinous part of the hide, and the tan, or astringent principle of oak bark, and other vegetable substances. It is well known that unless hides are speedily dried, they become putrid, and consequently unfit for use. But even although they be successfully dried, they are still unfit for the manufacture of shoes and other necessary articles; being permeable to moisture, and liable to be soon destroyed by friction. Consequently, in almost every country where animal hides are used for purposes of

convenience, they are made to undergo certain modes of treatment, which render them not only impermeable to water, but also tougher, and more pliable, so as to be easily and advantageously worked.

The combination of the vegetable astringent principle, or tannin, with the gelatine, (which forms almost the whole of the hide,) changes it into leather, which is a substance totally different in its properties to the hide in its raw state. To tan a hide then is to saturate it with tannin.

Previous to the operation of tanning, the raw or green hides must undergo the process of washing and scouring, to free them from foreign matter, and to remove the hair. Hides are first put to steep in water, either pure or acidulated, to clear them from the blood and filth they may have collected in the slaughter house. They are left to soak in the water for some time; and then *handled*, or trod upon by the feet, the better to cleanse them of all impurities. If the hides are dry they are steeped a longer time, sometimes for four days, or longer according to the season of the year, and care is taken to draw them out once a day, in order to stretch them on a wooden horse or beam. These two operations are repeated till the skin becomes raised or well softened. A running stream is necessary in these operations, else, the hides cannot fail of being ill prepared.

When the hides have been well raised, and softened, they are next freed from the hair, by the application of lime. In all tanneries, pits are formed having their sides lined with stone or brick, in which lime stone is slacked, so as to form milk of lime. Of these there are three kinds, according to the strength

of the lime. The hides intended to be scoured, are first put into the weakest of these pits, wherein they are allowed to remain, until the hair readily yields to the touch.

If this liquor be not sufficiently active, the hides are removed to the next in gradation, and the time they have for soaking is longer or shorter, in proportion to the strength of the lime, the temperature of the air, and the nature of the hides. Those of sheep require to remain in the pits only a few days. It has been proposed to substitute *lime water* in place of the milk of lime. But though the lime water acts at first with sufficient strength, its action, is not sufficiently permanent, and in order to succeed in clearing the hides, it is necessary to renew it occasionally. In some tanneries, after the hides have been kept in the pits for a short time, they are piled up in a heap on the ground; in which state they are suffered to remain for eight days, after which they are returned into the same pits from whence they were taken, and the process is repeated till the hair can be easily scraped off. Hides may also be cleansed by subjecting them to an incipient fermentation, produced by souring a mixture of barley flour in warm water, and soaking the hides in it, till they are sufficiently swelled and softened to admit of being cleared from the hair. In each tan house are placed several tubs full of this acid liquor, which is of different strengths in proportion as it is soured. In those containing the weakest liquor, the hides are first soaked, handled, and washed; and after two, or at most three of these operations, they are sufficiently prepared to admit of being freed from the hair.

If more easily procured, rye flour may be substituted for barley.

The Calmuck Tartars employ sour milk with the same view, and Pseiffer proposes the use of the acid-water obtained from the distillation of coal and turf. It indeed appears sufficiently ascertained, that all the vegetable acids, and even diluted sulphuric acid, answer equally well for this purpose.

In some tanneries they cleanse the hides by throwing salt over the one half of the skin, and doubling the other half over it; in proportion as each hide is salted, they are laid one above another, and the whole are covered with straw or flax; fermentation soon begins, after which they are turned once or twice daily, until they are found to be in a proper state for removing the hair. They may be cleansed however, much in the same manner, without the employment of salt, by piling them up on a bed of litter, and covering them with the same material for twenty four hours. At the end of this period, they are turned over, and afterwards examined twice a day, in order to ascertain when the hair may be readily removed.

In some tanneries the hides are buried in dung, while in others, they are simply exposed in a close apartment, termed a smoke house, heated by means of a tan fire, which gives out smoke without flame. The hides are suspended on long poles placed across these apartments, which are heated very considerably.

All the methods in which fermentation is employed, are termed *heating processes.* In whatever manner this operation has been conducted, as soon as

the hair is in a fit state to be removed, it is scraped off, on the wooden horse, by means of a blunt knife, or by a whet-stone. This operation is not only intended to remove the hair, but likewise the scarf-skin or epidermis, which is of a very different nature from that of the true skin. It is insoluble in water, and alcohol; is soluble in acids, but not susceptible of combination with tan, so that when left on the hide, the tan can only penetrate through the under side, by which means the process of tanning is rendered extremely tedious.

There are many vegetable substances which possess the tanning principle, or tannin; but those which possess most, are the oak, alder, willow, and Peruvian barks, also the gallnut. The Peruvian bark, from its scarcity and high price, is only used in medicine. As oak bark possesses more tan than any other vegetable substance, it is generally used for tanning. This bark being stripped from those trees which are cut down in the spring of the year, is dried in covered heaps, in the open air. It is then ground to a coarse powder in a mill, and mixed with water in the tan-pits. The infusion, or liquor, which is of a brownish amber colour, is called *ooze;* but is, properly speaking, a solution of tannin and other vegetable matters.

The hides, being scoured, raised, and softened, are first subjected to the action of weak ooze in one of these pits: here they remain for several weeks, and in the interim are frequently agitated and handled. From thence it is removed to a pit containing a stronger infusion, where it remains for a considerable time; that is, until it has absorbed all the tan. It is now immersed in a still stronger infusion, and so on.

When the hide has attained the colour of cinnamon bark on its outside, and when its internal parts are equally brown when cut through with a knife; it has received its full dose of tan, and is converted into leather. But if a white or greyish streak appear in the centre of the hide or skin, it is to be again immersed in the tan-pit. Calf skins require only about two or three months, before the process of tanning is finished; whereas ox hides are not perfectly converted into leather, for six, eight, or even fifteen months. When perfectly tanned, the hides are taken out, drained, passed between two iron cylinders, that they may become pliant, and are then hung up in a drying house, until they become perfectly dry by exposure to the air. The smaller hides now undergo the operation of currying, which renders them pliant, and reduces them to a uniform thickness.—This consists in cutting, soaking, paring, scouring, stretching, and oiling. The leather is then blackened by a composition of lamp-black, oil, and tallow; which is rubbed hard into the fleshy side. It is now fit for sale.

Observations. It is to be observed that leather would be tanned much sooner, and equally well, if the tan-pits were made within a building, so as to be secured from rain; and if the building were furnished with flues or steam pipes, so as to keep the temperature of the vats constantly at a full summer heat. Another important improvement might be made in tanning, if the skins were hung vertically in the pits, so that the tanning liquor might, from the first part of the process, touch every part of the skin equally.

PATENTS.

METHOD OF TANNING LEATHER, BY THE DECOCTION OF BARK.

In 1804, a patent was granted in England, for an improved method of tanning hides: viz. by immersing them in the liquor in which oak bark had been boiled. According to this improvement, the patentees filled a boiler of copper (or any other metal that does not stain or colour the liquor) half full of ground bark, and poured water upon it up to the brim. The whole is then boiled for three hours, till the tanning principle is completely extracted. The liquor is then suffered to run off by a cock into pits, where it stands to cool. The hides are now put into the liquor and *handled* frequently by taking them out and putting them in again, because the liquor is too powerful for them to remain long in at a time in the first stages of tanning. They are then to be removed to fresh liquors, from time to time as the old is weakened, until the operation is complete. By this method a greater quantity of the tanning principle is collected into a small compass, less bark is consumed, and there is a great saving of labour.

If leather is required of a lighter colour or bloom, a small quantity of the dust of bark is mixed with the liquor. By this method, hides that have been shaved in the baits, may be better tanned in two or three weeks, and skins in ten or twelve days, than in the one case in nine months, and in the other in six months by the usual process.

Observations. Here, the great advantage is that derived from extracting the tanning principle by

means of boiling; as business to any extent may be carried on with about one tenth part of the capital employed on the old plan.

Besides bark, the patentees make use of oak chips, and oak sawdust, they have succeeded with the common heath or heather; and they find that the bark of most trees that produce hard wood has a tanning principle in them; but above all, they recommend the young shoots from the roots of oaks, and the superfluous twigs or branches that may be lopt off, so as not to injure the trees. These, when cut in the proper season, may be chopped and ground, and boiled with bark, and will produce a stronger tanning liquor than bark from the trunks of trees that have a thick rind, which cannot be separated from the bark.

By another patent in 1819, the art of tanning by decoction is still further improved. This patentee has proved that the trunk, roots, limbs, branches and *leaves* of the oak, whether tree, pollard, coppice, or underwood, possess tanning properties in a sufficient quantity to be employed with advantage for tanning, by reducing them to chips or sawdust, and then boiling and using them in the following way:

To tan calf, or other thin skins, put one hundred weight of the limbs or branches, chopped as above mentioned, into a copper containing about sixty gallons of water, and boil, till the water be reduced to from thirty five to forty gallons, draw off the decoction.

Now add to the same limbs or branches, forty gallons of water, and again boil till the water be reduced to about twenty five gallons. The liquor thus produced by the second boiling is used as a weak ooze,

in the first process of immersing the calf skins, after they come from the scouring beam. The decoction first produced, is then to be used in the same way.

To tan hides, take one hundred weight of the limbs or branches, three quarters of a hundred weight of oak sawdust, (the sooner the latter is used after being made the better,) and one quarter of a hundred weight of the root, boil in eighty gallons of water, till reduced to from fifty to sixty gallons. Draw off the decoction and put it aside for use. To the materials left in the copper add sixty gallons of water, and again boil till reduced to from thirty to thirty five gallons. The liquor produced by this second boiling is to be employed in the first stage of tanning hides after they come from the beam; and afterwards, the decoction first produced is to be employed. The skins and hides having undergone the before mentioned processes, add as much oak bark or tan liquor, or both, to the respective decoctions, as is necessary to complete the tanning. The quantity of each will vary according to the strength of such decoctions; which strength will depend on the age and size of the tree, and other circumstances.

CONVERSION OF SHEEP SKINS INTO LEATHER.

Sheep skins which are used for a variety of purposes, such as gloves, book covers, &c., and which, when dyed, are converted into mock Morocco leather, are dressed as follows:

They are first to be soaked in water and handled, to separate all impurities, which may be scraped off by a blunt knife on a beam. They are then to be hung up in a close warm room to putrefy. This pu-

trefaction loosens the wool, and causes the exudation of an oily and slimy matter, all which are to be removed with the knife. The skins are now to be steeped in milk of lime, to harden and thicken, here they remain for a month or six weeks, according to circumstances, and when taken out, they are to be smoothed on the fleshy side by a sharp knife. They are now to be steeped in a bath of bran and water, where they undergo a partial fermentation, and become thinner in their substance.

The skins, which are now called *pelts*, are to be immersed in a solution of alum and common salt in water, in the proportion of one hundred and twenty skins to three pounds of alum and five pounds of salt. They are to be much agitated in this compound saline bath, in order to become firm and tough. From this bath they are to be removed to another, composed of bran and water, where they remain until quite pliant by a slight fermentation. To give their upper surfaces a gloss, they are to be trodden in a wooden tub, with a solution of yolks of eggs in water, previously well beaten up. When this solution has become transparent, it is a proof that the skins have absorbed the glazing matter. The pelt may now be said to be converted into leather, which is to be drained from moisture, hung upon hooks in a warm apartment to dry, and smoothed over with warm hand-irons.

Observations. To prepare sheep leather for various elegant purposes, by dying; the skins, after being taken from the lime bath, are to be immersed in another, composed of dog and pigeon dung dissolved by agitation in water: here they remain until the

the lime is separated, and until the skins have attained the state of *soft pliable pelt.* To dye this pelt red, the skins are to be washed and sewed into bags, and stuffed with clippings and shavings of leather, or any other convenient substance, and immersed with the *grain side outwards*, in a bath of alum and cochineal of the temperature of 170° or 180° Farenheit, where they are to be agitated until they are sufficiently dyed. Each bag is now to be transferred to a sumach bath, where they receive consistency and tenacity. From this bath it is customary to remove the skins, and to plunge them into a saffron one, to improve their colour. To dye these skins *black*, the washed pelt is to be first immersed in the sumach bath, and then to be rubbed over on the grained side, by a stiff brush dipped in a solution of acetate, or pyrolignite of iron.

To give these skins the grain and polish of morocco leather, they are first oiled, and then rubbed on a firm board by a convex piece of solid glass, to which a handle is attached. The leather being now rendered more compact, is rubbed or pressed hard by a sharply grooved box wood instrument, shaped like the glass one just described.

Lamb and kid skins are dressed, tanned, and dyed in a similar manner.

MANUFACTURE OF REAL MOROCCO LEATHER.

Goat skins are to be cleansed, have their hair removed, and to be limed as in the before mentioned processes. They are then to undergo a partial fermentation by a bath of bran and water, and afterwards to be immersed in another bath of white figs

and water, where they are to remain for five or six days. It is now necessary to dip them in a solution of salt and water, to fit them for dyeing. To communicate a red colour, the alum and cochineal bath is to be used as for sheep skins; for *black*, sumach and iron-liquor as before; and for *yellow*, the bath is to be composed of alum and the pomegranate bark.

The tanning, dressing, and graining are the same as for sheep skins.

MANUFACTURE OF RUSSIA LEATHER.

Calf skins being steeped in a weak bath of carbonate of potass and water, are well cleaned and scraped to have the hair, &c., removed. They are now immersed in another bath, containing dog and pigeon dung in water. Being thus freed from the alkali, they are thrown into a mixture of oatmeal and water to undergo a slight fermentation. To tan these hides, it is necessary to use birch bark instead of oak bark; and during the operation they are to be frequently handled or agitated. When tanned, and perfectly dry, they are made pliable by oil and much friction; they are then to be rubbed over gently with *birch tar*, which gives them that agreeable odour, peculiar to this kind of leather, and which secures them against the attacks of moths and worms. This odour the leather will preserve for many years; and on account of it, Russia leather is much used in binding handsome and costly books. The marks, or intersecting lines on this leather, are given to it by passing over its grained surface a heavy iron cylinder bound round by wires.

Observations. To dye this leather of a *black* colour, it is to be rubbed over, after tanning, with a solution of acetate, or pyrolignite of iron; to dye it *red*, alum and Brazil wood are used. At Astrakhan, in Tartary, another kind of leather, both beautiful and durable, is manufactured from deer and goat skins. They are cleansed and dressed in the same manner as sheep skins, and then put into a bath of bran in a state of fermentation with water for three days. Each skin is then put into a wooden tray, where being spread out, it receives a portion of a liquor composed of honey and water. When the skin has combined with this liquid, it is immersed in a very salt brine for a short time, and is then dried. To dye it *red*, it is to be made up in bags, and dipped in a bath of cochineal, containing an alkaline plant found in the deserts; it is now to be immersed in a solution of alum, and then tanned with sumach. To give this leather a more brilliant and lasting red, it is dipped in an infusion or decoction of galls, instead of sumach. When to be dyed *yellow*, the berries of buckthorn, or the flowers of wild camomile are used. The graining of this leather is given by an iron instrument of great weight, having a number of blunt points.

METHOD OF TANNING FISH AND OTHER NETS.

The following method was invented by a shipbuilder at Bridport. He put one hundred weight of oak-branches and one hundred weight of spent bark from any tannery into one hundred gallons of water, and so in proportion, for a greater or less quantity. After boiling the same, till it is reduced to about eighty gallons, he takes the branches and spent bark

from the copper, by means of any convenient instrument, and then immerses as many nets, sails, or other articles, as are required, into the liquor left in the copper; taking care that they are completely covered. He boils the whole together for about three hours, then removes the fire, and suffers the liquor to get cool; after which removes the nets, sails, or other articles, from the furnace, and hangs them up to dry.

TESTS.

Experiments on the discovery of certain substances in combination with others by means of Tests.

Tests are substances which detect the presence of other substances in combination with any solvent, or known compound body. Their action depends upon the affinity existing between the substance added, and any component part of the body under trial; whereby a new compound body is formed, differing essentially both from the Test and the body acted on.

Proof by Tumeric Paper that Potassium is the Base of Potass, and Sodium of Soda.

Dip a half sheet of tumeric paper in a bason of distilled water, and shake off the superfluous drops; spread it on a shallow plate and drop on it a large globule of potassium, or sodium. Either of these will immediately commence a rapid motion in all di-

rections on the paper, staining it of a dark brown colour, in lines as it moves along.

Observations. Here the potassium or sodium having a great affinity for oxygen, combines with it wherever it is to be found in a weaker state of affinity for any other substance, than for itself. In this case, the distilled water is decomposed, and its hydrogen set free:—the oxygen combining with the metal. The brown colour of the stains on the paper, is owing to the action of a new formed substance on the vegetable colouring matter of the tumeric: This new substance is the oxide of potassium or sodium; or as they are usually called, potass, or soda.—Therefore potass or soda being alkalies have the characteristic effect of alkalies on the colouring matter.

Test to discover the presence of Gold, in solution.

Pour about ten or twelve drops of nitro-muriate of gold into a wine glass containing distilled water; the mixture will in the present case be colourless, but if it be stirred round with a piece of tin, or a slip of tinned iron; it will assume the appearance of port wine. This precipitate, (which is the same as that known by the name of the *purple precipite of cassius,*) will soon fall down in the form of a purple powder.

Tests for Lead aud Copper in Wine, Cider, Perry, &c.

Put into a crucible one ounce of sulpher, and one ounce of pure lime; and keep them in a white heat for nearly half an hour; when cold, add one ounce

of the super-tartrate of potass, and boil the whole in a mattrass with some distilled water for about half an hour. Decant the supernatent liquor into small phials, adding about twenty or thirty drops of muriatic-acid to each. The phials must be well stopped and preserved for use. Lead, copper and other deleterious metals will be precipitated, of a black colour, by this liquid, if poured, in the quantity of only a few drops, into the suspected wine or cider.

Observation. The muriatic acid is added to this test, to prevent the precipitation of iron, which might exist in the wine without any mischief resulting from its use.

Another Method.

Another test for these pernicious metals in wine and cider, exists ready formed in nature. Pour into a glass of suspected wine, cider, or perry, a few drops of Harrowgate or Strathpeffer water. If any lead, &c. be present, it will fall down in the state of a black precipitate, being combined with the sulphuretted hydrogen by which these waters are impregnated.

Obervation. Lead is used by many wine merchants to give an astringency to port wine; that is, that like old port it may appear rough to the tongue. Sometimes they hang a sheet of lead in the cask; at others, they pour in a solution of acetate (sugar) of lead; for the purpose of sweetening, as they term it.

A noted London wine merchant, acknowledged on his death-bed, that, in the long course of his extensive business, he had seen numbers of his customers fall victims to their predeliction for his wines; and

had remarked that no man ever lived long, who habitually drank them!!!

Arsenic is used to give an oily appearance to sherry, madeira, and other pale wines.

If the Harrowgate water is used as a test, it will be proper, previously, to pour into the glass of wine, &c. a few drops of muriatic acid, to hold the iron in solution, as the sulphureted hydrogen has not the power of taking it from this acid. A solution of iron may exist in the wine without the least detriment to the consumer.

To detect Alum in Red Wine.

Add to the wine a sufficient quantity of a strong solution of chlorine in water, (oxygenated muriatic acid,) until it is changed to a yellow colour: let the precipitate, (composed of the chlorine and the vegeto-animal matter contained in the wine,) which immediately forms, become settled; then filter the liquor, and evaporate it to one fourth of its volume; it will now, in consequence of the presence of the alum, have an astringent sweetish taste, and will furnish a *white* precipitate on the addition of nitrate of barytes, which is insoluble in water and in nitric acid. It will give a *yellowish white* precipitate with pure potass, that is soluble on the addition of an excess of the potass; and a precipitate of the same colour with the sub-carbonate of soda, which is decomposed by the action of heat into carbonic acid gas and alum, substances easily to be recognized by their characteristics.

Test to detect the Adulteration of Essential Oils.

Essential oils are often adulterated by alcohol, also by fixed and essential oils of cheaper price. To detect alcohol, pour two drams of distilled water into a dram of the suspected oil; the whole will become milky if alcohol be present. To detect fixed oils, as almond, and olive oil, let a drop of the suspected oil fall on a piece of writing paper, and hold it near the fire; if the whole evaporates, and leaves no stain upon the paper, there is no fixed oil present; but if a stain remains, that is, if the part where the drop fell appears greasy or transparent, the essential oil has been adulterated either by almond, or olive oil.

Solvent for Silver; and Tests for its Adulteration by other Metals.

Dissolve an ounce of nitrate of potass in eight ounces of sulphuric acid in a glass vessel over a lamp, and put into it several pieces of impure silver, or suspected coin. When the liquid arrives at the temperature of 220°, the silver will be acted on by (what may be termed) nitro-sulphuric acid: this action will be attended by an evolution of nitrous gas.

Observations. The best property of this solvent is, that it does not act on any other metal than the silver; consequently if base silver coin be held with a forceps in this hot acid, it will be quickly stripped of its silvery coat, and the copper, &c., will be exposed to view. This compound acid is also useful in the large way, in extracting pure silver from old plated goods, as the copper, &c., cannot be acted on.

Muriate of Tin a Test for Tannin.

As it is of importance in many cases to ascertain the existence of tannin, or the astringent principle in vegetable infusions, the following may be depended on as a delicate test. Pour a few drops of the solution of muriate of tin into a wine glass containing an infusion of gall-nuts, or of Peruvian, or oak bark. This salt will form an insoluble precipitate with the tannin, contained in each of these.

Test for the Purity of Alcohol.

It is a common practice for apothecaries, in order to ascertain if spirit of wine be sufficiently strong, to pour some into a cup upon gunpowder, and then to set fire to it. If the spirit be sufficiently strong, after burning down to the gunpowder, it will inflame; but if too much water had been mixed with it, that would not take place, as, after the spirit was consumed, there would still be water enough left to keep the gunpowder wet.

To detect the Adulterations of Tea.

The Chinese sometimes mix the leaves of other shrubs with tea; but this is easily discovered, (if not at first sight,) by making an infusion of it, into which put a grain and a half of blue vitriol, or copperas; if it be good genuine *green tea*, and set in a good light, it will appear of a fine light blue; if it be genuine *bohea*, it will turn of a blue next to black; but if they be adulterated, green, yellow and black colours will be seen in them.

After this fraud was detected, the Chinese *dyed* the leaves of damaged and ordinary green tea, with Japan earth, (terra Japonica,) which gives the leaf, the infusion, the tincture, and the colour of bohea. This is to be discovered many ways: First, a less quantity of this dyed tea, gives a deeper colour to the same proportion of water, than if it was good. Secondly, the colour it gives the water will also be of a reddish brown, whereas it should be dark. Thirdly, when the leaves have been washed, by standing a little, they will look greener than good bohea. Fourthly, this dyed tea is generally much larger; therefore it is a good way also to buy the least leaf bohea. Fifthly, the infusion, which should be smooth and balsamic to the palate, tastes rough and more harsh. Sixthly, if milk is poured into it, it will rise reddish instead of a dark or blackish brown. Seventhly, a little sulphate of iron put into this liquor, will turn it a light blue, which otherwise ought to be of a deep blue inclining to black. And eighthly, water of ammonia makes the good tea of a deep brownish yellow, after it has stood awhile, like new drawn tincture of saffron; but it has not that effect on bad tea.

Green tea is also counterfeited, by dying bad bohea with green vitriol. But this is also easily discovered: First, if a bit of gall is put into the infusion, it will turn it of a deep black colour; which it would not do, where there no sulphate of iron in it, for galls do not tincture tea naturally. Secondly, if the liquor is of a pale green, and inclines to a bluish dye, it is bad. Thirdly, spirits of hartshorn will make it of a purple colour, and cause a slight preci-

pitation, instead of a deep greenish yellow, when it has stood for about six minutes.

BLACKING.

BLACKING BALLS FOR SHOES.

Take mutton suet, four ounces; bees-wax, one ounce; sweet oil, one ounce; sugar candy, and gum arabic, one dram each, in fine powder; melt these well together over a gentle fire, and add thereto about a spoonful of turpentine, and lamp black sufficient to give it a good black colour. While hot enough to run, make it into a ball, by pouring the liquid into a tin mould; or let it stand till almost cold; or it may be moulded by the hand.

LIQUID JAPAN BLACKING.

Take three ounces of ivory black, two ounces of coarse sugar, one ounce of sulphuric acid, one ounce of muriatic acid, one lemon, one table spoon full of sweet oil, and one pint of vinegar. First mix the ivory black and sweet oil together, then the lemon and sugar, with a little vinegar to qualify the blacking; then add the sulphuric and muriatic acids, and mix them all well together.

Observation. The sugar, oil, and vinegar, prevent the acids from injuring the leather, and add to the lustre of the blacking.

CHEAP METHOD.

Ivory black, two ounces; brown sugar, one ounce and a half; and sweet oil, half a table spoon full.—

Mix them well, and then gradually add half a pint of small beer.

ANOTHER METHOD.

A quarter of a pound of ivory black, a quarter of a pound of moist sugar, a table spoonful of flour, a piece of tallow about the size of a walnut, and a small piece of gum arabic: make a paste of the flour, and whilst hot put in the tallow, then the sugar, and afterwards mix the whole well together in a quart of water.

BUTTER.

SUCCESSFUL METHOD OF CURING BUTTER, AS PRACTISED IN SCOTLAND.

It is well known, that butter, as it is generally cured, does not keep for any length of time, without spoiling or becoming rancid. The butter with which the metropolis is supplied, may be seen at every cheese-mongers, in the greatest *variety of quality and colour;* and it is too often the case, that even the worst butter is compounded with better sorts, in order to procure a sale. These practices are detestable, and should be discountenanced by the legislature. Indeed, no butter should be permitted to be sold, but such as is of the best quality when fresh, and well cured when salted; as there is hardly any article more capable of exciting disgust than bad butter.

But to obtain a reform in this matter, it is necessary to commence with the practices of the dairy; and the following process is recommended as the

best at present known. Reduce separately to fine powder in a dry mortar, two pounds of best, or whitest common salt; one pound of salt-petre; and one pound of lump sugar. Sift these ingredients, one above another on two sheets of paper joined together; and then mix them well with the hands, or with a spatula. Now preserve the whole in a covered jar placed in a dry situation. When required to be used, one ounce of this composition is to be proportioned to every pound of butter and the whole is to be well worked into the mass. The butter is to be be packed in casks, &c. in the usual way.

Observations. The above method is practised in many parts of Scotland; and is found to preserve the butter much better, than by using common salt alone. If butter made at one time be divided into two parts, and one be salted in the common way, whilst the mixture above mentioned is worked into the other, the difference in the quality of the two, will be found to be beyond all conception. The butter cured with this mixture appears of a rich marrowy consistence and fine colour, and never acquires a brittle hardness, nor tastes salt; the other will be comparatively hard and brittle, approaching more nearly to the appearance of tallow, and is much salter to the taste. Butter cured by the above composition has been kept three years, and was as sweet as at first; but it must be noted, that butter thus cured requires to stand at least three weeks or a month before it is used. If it be sooner opened, the salts are not sufficiently blended with it, and sometimes the coolness of the nitre will then be percieved, which totally disappears afterwards.

One more observation on the preservation of butter is necessary. It is universally allowed that cleanliness is indispensible, but it is not generally suspected, that butter from being made in vessels or troughs lined with lead, or in glazed earthenware pans, (which glaze is principally composed of lead,) is too apt to be contaminated by particles of that deleterious metal. If the butter is in the least degree rancid, this can hardly fail to take place, and it cannot be doubted, that during the decomposition of the salts, the glazing is acted on. It is better, therefore, to use tinned vessels for mixing the preservative with the butter, and to pack it either in wooden vessels, or in jars of stone, which, vitrified throughout, do not require an inside glazing.

CHEESE.

MANUFACTURE OF PARMESAN CHEESE.

This cheese has long been famous for its richness and flavour; the following mode of manufacture is described in the *Annals de Chimie*. The size of these cheeses varies from 60 to 180 pounds, according to the number of cows in each dairy. During the heat of summer, cheese is made every day, but in the cooler months, milk will keep longer, and the cheese is made every other day. The summer cheese, which is the best, is made of the evening milk, after having been skimmed in the morning and at noon. Both kinds of milk are poured together into a cauldron capable of holding about one hundred and thirty gallons, of the shape of an inverted

bell, and suspended on the arm of a lever, so as to be moved off and on the fire at pleasure. In this cauldron the milk is gradually heated to the temperature of about 120°; it is now removed from the fire, and kept quiet for five or six minutes. When all internal motion has ceased, the *rennet* is then added, this substance is composed of the stomach of a calf, fermented together with wheaten meal and salt; and the method of using it, is, to tie a piece of the size of hazle nut in a rag, and steep it in the milk, squeezing it from time to time. In a short time, a sufficient quantity of rennet passes through the rag into the milk, which is now to be well strained, and afterwards left to rest that it may coagulate. In about an hour the coagulation is complete, and then the milk isagain put over the fire and raised to a temperature of about 145 degrees.

During all the time it is heating, the mass is briskly agitated, till the curd separates in small lumps; part of the whey is then taken out, and a small portion of saffron is added to the remainder to colour it. When the curd is thus broken sufficiently small, nearly the whole of the whey is taken out, and two pailfuls of cold water is poured in, the temperature is thus lowered, so as to enable the dairy-man to collect the curd, by passing a cloth beneath it, and gathering it up at the corners; the curd is now pressed into a frame of wood like a bushel without a bottom, placed on a solid table, and covered by a round piece of wood, having a great stone or weight on the top. In the course of the night it cools, assumes a firm consistence, and parts with the whey; the next day one side is rubbed with salt, and the

succeeding day the cheese is turned, and the other side then rubbed with salt in the same manner as before. This alternate salting of each side is practised for about forty days; after this period, the outer crust of the cheese is pared off, and the fresh surface is varnished with linseed oil. The convex sides are then coloured red with arnotto, and the cheese is fit for sale.

CIDER.

The process of making cider is so simple, so generally practised, and considered to be so well understood in every part of the United States, that any observations on the subject would seem to be almost superfluous. Unfortunately, however, this very simplicity and general knowledge of the operation tends to ruin three fourths of the cider that is made.

The increase of orchards, and the real value of cider itself, has rendered it an article of considerable importance, not only as an object of commerce, but as a valuable beverage for home consumption. To the farmer himself, a mug of sweet cider is frequently considered as a great luxury; and by labourers it is preferred, by way of breakfast, to tea, coffee, or milk; and in the harvest field, to the more intoxicating liquors generally prepared for them.

Yet, notwithstanding this great utility and general use of cider, how seldom do we find it, among the majority of farmers, fit to drink in the month of February. To what cause can this be attributed, when, on the other hand, we sometimes find cider that has

retained its original flavour and sweetness for eighteen months ?

An exposition of the causes, the method of avoiding them, and some directions for keeping cider, we trust will not be deemed improper, and may possibly lead to some improvement in this subject, so important to the community.

In the first place, the mill is not perfectly cleaned, previously to grinding the apples; next, the apples are picked green, ripe, and rotten, as it may happen, and together with a quantity of grass and leaves, are all ground up; and lastly, the liquor without straining, (and consequently with a good deal of pomage in it,) is put into dirty casks, the bung being loosely stopped with straw, and rolled away into the cellar, where no further attention is thought necessary until the cider is wanted for use; when, in consequence of this very improper mode of treatment, it is found perfectly sour. English writers on this subject give a great many directions, but as they all require more labour than we can command, and are all of little use in this country; the time for making keeping cider, occuring in one of the busiest seasons of the year, what, however, may be usefully mentioned, and agrees with our experience, are the following directions.

That the apples should be, as nearly as possible, of an equal degree of ripeness; and if not perfectly ripe when gathered, should be put in a heap for a few days to mellow.* When ground, care should

* The farmer would even find an advantage in throwing out all the bitter, unripe, and rotten apples, and the whole process should be carried on under cover.

be taken that every thing be perfectly clean. and the straw used in making the cheese should be free from must or any disagreeable smell which might be imparted to the cider. The pomage should remain from twelve to twenty four hours after grinding, before it is pressed; the cider must be carefully strained, and put into clean casks, avoiding new ones, unless made of perfectly seasoned wood, or such as have had any liquid in them which might flavour the cider. Here may be found the grand stumbling block of most farmers. When a cask of cider is run out, there will generally be left a few gallons of lees; the bung and spigot hole are left open, and in this situation it frequently remains until the next cider season, when, after a few scaldings, which are of little effect, it is filled with fresh cider; the inevitable consequence is, the cider will become sour. To avoid this, so soon as a cask is out, it should be completely emptied, and scalded perfectly clean, or well washed with lime water, dried, and bunged up close; it will then be found sweet when wanted. Much has been said in favour of racking off cider frequently, and though I am unwilling to differ from the high authorities upon which it is recommended, as the result of various experiments, yet I cannot but offer a few remarks on the subject. When cider is made late in the season, so as to undergo a slight fermentation, sufficient however to give it an agreeable vinosity, it may become a question, whether by suffering it to remain on the lees, they do not afford a kind of *feed*, by which it retains its strength and vinosity longer than it otherwise would do?

This however is more particularly applicable to cider for immediate use, it certainly being proper to rack off from the lees, that which is meant for keeping, sometime in the month of March, when the weather is too cold for fermentation, to which it is liable upon being agitated. It is also worthy of attention, whether cider racked off upon the subsiding of the first fermentation, which has been slight, does not immediately undergo another fermentation; (in consequence of the agitation and mixture of the fermentable principle which subsides with the lees,) which although almost imperceptible, in a short time renders the cider sour. Especial care must be taken to fill the barrel to the very top of the bung hole, at the last racking, that if any light or flying lees remain on the liquor, they may be removed at the bung hole, for this is frequently the case with mellow cider; and if those lees are permitted to remain in it, the surface by being exposed to the air, will become sour. That tartness will by degrees render all the cider of the same complexion. Yet, the taint may be perceived to descend gradually; for while the cider is sour at the top, it is sound a few inches below it, till it descends from top to bottom. This is the grand point in which people are wont to be deceived, and by which they are rendered out of humour with racking of cider, how much soever they are pleased with it, when it happens to answer their wishes. When their cider turns sour, they imagine that racking takes away the spirit of it, and that then it must become sour of course, for want of a body, as they are wont to speak; whereas in truth, it grows sour for want of skill how to secure it after the last rack-

ing, by removing the light lees which swim on the top, before they acquire the least degree of acidity.

The commencement of acidity may be known by a singing or hissing noise; this should be immediately attended to, and probably the most effectual and certain remedy, will be an addition of a small portion of high proof spirit,* and the bunging of the cask tight. Cider put into the cellar so soon as made, generally undergoes too great a fermentation. To prevent this when it is late in the season, the cask should be placed in the north side of a house, and completely protected from the sun; the warmth of the day disposes the cider to ferment, but the coldness of the night so far checks this disposition, that only a slight yet a complete vinous fermentation takes place.

When, however, this is completely stopped by the increased coldness of the weather, and before it freezes, the cider should be drawn off into casks placed in the cellar; about one gallon of spirit added to each hogshead: the casks then being closely bunged, no further fermentation will take place. This change of temperature is a powerful opponent to fermentation. But strong sweet cider, put into a cellar where there is a constant uniformity of temperature, even though it be very cool, will almost certainly ferment, and the fermentative principle once completely in action, can scarcely be stopped, but by a very great increase of cold. I am well aware that the ideas here advanced as to the necessity of clean-

* Columbian Whiskey or Wheat Spirit will be found to answer the best purpose. As Wine Vinegar is frequently added to Brandies, &c., which would be sure to injure the Cider.

liness, in every part of the operation, but particularly in the casks, will be *ridiculed* by many; having experienced the fact, that very fine cider has been produced where no further pains were taken by the owner, than to order an old negro with two or three boys, "to make the cider," and the casks were probably only washed with a little cold water. This however might only happen once in half a dozen years, and should be regarded as an accidental occurrence of circumstances, probably beyond the art of man to elucidate. It is an exception to a general rule, as in direct opposition to theory and correct principles; such accidental circumstances, therefore, should not be regarded by the man who wishes to act according to system.

When cider is wanted for making wine or any particular use, the last running from a pressing should be taken, as this will be found more pure and perfectly free from pomage.

RECEIPT TO MAKE CIDER,

AGREEABLY TO THE PLAN PRACTISED IN IRELAND.

After the apples are bruised and pressed in the usual manner, the juice should be immediately put into large open vessels, and suffered to remain in this situation from twenty-four to forty-eight hours, in order to deposit any crude matter which may have passed through the bag; and also to throw up the lighter particles in the form of scum, which should be carefully removed; the liquor is then to be drawn off and passed through a double flannel bag, removing the feculent matter by occasionally turning and rinsing it. When thus prepared, put two or three

gallons into a strong well bound cask, in which matches, (made by dipping linen rags in melted sulphur,) are to be lighted and suspended from the bung hole by means of iron wire, and the bung lightly put in, fresh portions of match must be added until they cease to burn on their being introduced into the cask, which should now be violently agitated for the purpose of assisting the absorption of sulphurous gas. After standing a quarter of an hour, draw it off into a tub, the cock and bung being left open, that the light unabsorbed gas may be suffered to escape; after remaining in this situation for about fifteen or twenty minutes, the operation must be repeated five or six times, with a like quantity of fresh liquor each time; return the different portions into the cask, and fill it up with filtered liquor; put a quart of spirits to every forty gallons, and insert the bung in the firmest and closest manner, so as to preclude the possibility of the internal air forcing a passage should it be disposed to ferment.

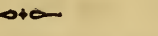
Observations. If the cider does not fine in three or four weeks, (which good cider almost always will,) add the whites of fifteen eggs, beat fine with a gill of clean sand to every hundred gallons.

Cider can be bottled to advantage in any month in the year, when properly fined, when intended for home use, and required to be brisk, and sparkling, it should be bottled in the months of March, April and May; when intended for exportation, it should be bottled later; the better to prevent breakage it should also be wired to be exported.

RATIONALE.

Sulphurous acid, which is formed by burning sulphur in confined portions of atmospheric air, has the well known property of checking fermentation, so that if the fresh juices of fruit be impregnated with this acid, it causes a suspension of the vinous fermentation, until sufficient time is afforded for the forming of the liquor, which on its being bottled, gradually ferments, and causes it to assume that fine sparkling appearance met with in English cider. In common sour cider, the fermentation has proceeded through the vinous to the acetous, and consequently in a state nearly approaching to vinegar.

In the mode usually practised, in making cider, in imitation of English; the fresh juice is at first put into the cask, and the whole drawn off when it shews signs of fermentation, the casks stoved with sulphur match, and the liquor immediately returned; racking off, and stoving it until it ceases to exhibit a disposition to ferment, which tedious process usually takes about six weeks, but which may be advantageously shortened by the substitution of sulphur matches, in larger proportions as before directed; so as to impregnate the liquor with sulphurous gas.



WHITE COLOURS IN PAINTINGS RESTORED,

BY OXYGENATED WATER.

A French painter, of the name of Merimee, having observed, in a design by Raphael, that the lights had lost their brightness, applied to M. Thenard for his advice. This chemist ascribed the effect to the

circumstance, that the white lead dissolved in water had become sulphuretted by the lapse of time, and had been changed from white to black. Accordingly, he sent to M. Merimee some slighty oxygenated water, which was applied to the black parts, and the white colour was instantly restored. The water contained only five or six times its volume of oxygen.

TO RESTORE THE LUSTRE OF GOLD OR SILVER LACE, WHEN TARNISHED.

When gold or silver lace happens to be tarnished, the best liquor that can be used for restoring its lustre, is spirits of wine. It should be warmed before it is applied to the tarnished spot. This application will preserve the colour of the silk, or embroidery.

WHITENING SILVER BY BOILING.

Whitening silver by boiling is one of the methods of parting copper from silver in the humid way.—For this purpose, silver wrought in any shape is first ignited to redness, and afterwards boiled in a ley of muriate of soda, and acidulous tartrite of potass. By these means the copper is removed from the surface and the silver receives a better appearance.

METHOD OF CLEANING SILKS, WOOLENS, AND COTTONS, WITHOUT DAMAGE TO THEIR TEXTURE OR COLOUR.

Grate raw potatoes to a fine pulp in clean water, and pass the liquid matter, through a coarse sieve, into another vessel of water; let the mixture stand still till the fine white particles of the potatoes are

precipitated; then pour the mucilaginous liquor from the fecula, and preserve the liquor for use. The article to be cleaned should then be laid upon a linen cloth on a table, and having provided a clean sponge, dip it into the potatoe liquor, and apply it to the article to be cleaned, till the dirt is perfectly separated, then wash it in clean water several times. Two middle sized potatoes will be sufficient for a pint of water.

Observations. The coarse pulp, which does not pass through the sieve, is of great use in cleaning worsted curtains, tapestry, carpets, and other coarse goods. The mucilaginous liquor will clean all sorts of silk, cotton, or woolen goods, without hurting or spoiling the colour, it may be also used in cleaning oil paintings, or furniture that is soiled. Dirtied painted wainscots may be cleaned by wetting a sponge in the liquor; then dipping it in a little fine clean sand, and afterwards rubbing the wainscot with it.

SCOURING BALLS.

Portable balls for removing spots from clothes, may be thus prepared. Fuller's earth perfectly dried, (so that it crumbles into a powder) is to be moistened with the clear juice of lemons, and a small quantity of pure pearl-ashes is to be added. Knead the whole carefully together, till it acquires the consistence of a thick elastic paste: form it into convenient small balls, and dry them in the sun. To be used, first moisten the spot on the clothes with water, then rub it with the ball, and let the spot dry in the sun; after having washed it with pure water the spot will entirely disappear.

METHOD OF SEASONING MAHOGANY.

This method, which was discovered by Mr. Callender, and for which he was rewarded by the Society of Arts, is both simple and efficacious.

Having provided a steam-tight wooden box, capable of holding conveniently such pieces of mahogany as are fit for chairs, &c., he adapts to it a pipe from a boiler, by means of which he fills the box (after the mahogany has been put into it,) with steam, the temperature of which is about equal to that of boiling water. The time required for wood, an inch and a half thick, is about two hours; and pieces of this thickness are stated to become sufficiently dry to work, after being placed in a warm room or workshop for twenty-four hours. By this treatment, the wood is something improved in its general colour; and those blemishes, which are technically called *green veins*, are entirely removed. The eggs or larvæ, also, of any insect, which may be contained in the wood, will be destroyed by the heat of the steam.

Observations. Two very important advantages are said to result from Mr. Callender's process. In the first place, *a considerable part of the capital*, which is vested in wood lying to season during many months *may be saved.* And secondly, as none of the small wood, from two to six inches thick, is ever seasoned, according to the usual course of trade, chairs, ballustrades, and similar articles, which are usually made of such wood, must necessarily be very subject to warp, which inconvenience is prevented by adopting the expeditious mode of seasoning above described.

MODE OF PAINTING SAIL-CLOTH, &c.

SO AS TO BE PLIANT, DURABLE, AND IMPERVIOUS TO WATER.

This process which is extracted from the *Transactions of the Society of Arts*, is now universally practised in the public dock-yards in England.

The paint usually laid upon canvas, hardens to such a degree as to crack, and eventually to break the canvas, which renders it unserviceable in a short time; but the canvas painted in the new manner is so superior, that all canvas used in the navy is thus prepared; and a saving of a guinea is made in every one hundred square yards of canvas so painted.

The old mode of painting canvas was to wet the canvas, and prime it with Spanish brown; then to give it a second coat of a chocolate colour, made by mixing spanish brown and black paint; and lastly to finish it with black.

The new method is to grind 96 pounds of English ochre with boiled oil, and to add 16 pounds of black paint, which mixture forms an indifferent black. A pound of yellow soap dissolved in six pints of water over the fire, is mixed while hot with the paint.—This composition is then laid upon the canvas (without being wetted, as in the usual way) as stiff as can conveniently be done with the brush so as to form a smooth surface; the next day, or, still better, on the second day, a second coat of ochre and black (without any, or but a very small portion of soap) is laid on, and allowing this coat an intermediate day for drying, the canvas is then finished with black paint as usual. Three days being then allowed for it to dry and harden, it does not stick together when taken

down, and folded in cloths containing sixty or seventy yards each; and canvas finished entirely with the composition, leaving it to dry one day between each coat, will not stick together if laid in quantities.

Observations. It has been ascertained from actual trials, that the solution of yellow soap is a preservative to red, yellow, and black paints, when ground in oil and put into casks, as they acquire no improper hardness, and dry in a remarkable manner when laid on with the brush, without the use of the usual drying articles.

It is surprising that the adoption of soap, which is so well known to be miscible with oily substances, or at least the alkali of which it is composed, has not already been brought into use in the composition of oil colours.

VARNISH FOR BOOTS AND SHOES,

BY WHICH THEY ARE RENDERED IMPERVIOUS TO WATER.

The following method of effecting this useful purpose is related in Sir John Hawkin's edition of Isaac Walton's complete angler.

Take a pint of linseed oil, with half a pound of mutton suet, six or eight ounces of bees' wax, and a small piece of rosin. Boil all this in a pipkin together; and let it cool till it be milk-warm. Then with a hair brush, lay it on new boots, or shoes; but it is best that this varnish be laid on the leather, before the boots are made. The boots should also be brushed over with it, after they come from the maker. If old boots or shoes are to be varnished, the mixture is to be laid on, when the leather is perfectly dry.

METHOD OF VARNISHING HATS, SO AS TO BE IMPERVIOUS TO WATER.

A patent has lately been taken out by Messrs. Pritchard and Franks, for the following mode of rendering hats impervious to water. It must be premised, that the following list of ingredients is so redundant, as not to admit of application, either with success, or with advantage as to economy. It is therefore necessary to mark in *italics*, such ingredients as may with propriety be omitted in the composition; bearing in mind at the same time, that the quantity of alcohol is also to be reduced.

The shell of the hat is to be prepared of the usual materials, and dyed and formed into shape in the usual way. When perfectly dry, it is to be stiffened with the following composition, worked upon the inner surface:—One pound of *gum kino*, eight ounces of gum elemi, three pounds of *gum olibanum*, three pounds of gum copal, two pounds of *gum juniper*, one pound of *gum ladanum*, one pound of gum mastic, ten pounds of shell-lac, and eight ounces of frankincense; these are pounded small and mixed together; three gallons of alcohol are then placed in an earthen vessel, to receive the pounded gums; the vessel is then to be frequently agitated.

When the gums are sufficiently dissolved by this process, the patentees add to the mixture, one pint of liquid ammonia, and one ounce of oil of lavender, with a pound of *gum myrrh and gum opoponax, dissolved in three pints of spirit of wine.* The whole of the ingredients being perfectly incorporated, and free from lumps, constitute the water-proof mixture with which the shell of the hat is stiffened.

When the shell has been dyed, shaped, and rendered perfectly dry, its inner surface and the under side of the brim are varnished with this composition by means of a brush. The hat is then to be placed in a warm drying room until hard. This process is repeated several times, taking care that the varnish does not penetrate through the shell, so as to appear on the outer side. To allow the perspiration of the head to evaporate, small holes are to be pierced through the crown of the hat from the inside outward; and the nap of silk, beaver, or other fur, is to be laid on by the finisher in the usual way; that on the under side of the brim, which has been prepared as above, is to be attached with copal varnish.

EXCELLENT VARNISH FOR SILKS, &c.

To one quart of cold-drawn linseed oil, poured off from the lees (produced on the addition of unslacked lime, on which the oil had stood eight or ten days at the least, in order to communicate a drying quality. or brown umber, burnt or pounded which will have the like effect,) add half an ounce of litharge; boil them for half an hour, then add half an ounce of the copal varnish. While the ingredients are on the fire, in a copper vessel, put in one ounce of chios turpentine or common rosin, and a few drops of neatsfoot oil, and stir the whole with a knife, when cool it is ready for use. The neatsfoot oil prevents the varnish from being sticky or adhesive, and may be put into the linseed oil at the same time with the lime, or burnt umber. Resin or chios turpentine may be added till the varnish has attained the desired thickness.

Observations. The longer the raw linseed oil remains on the unslacked lime or umber, the sooner will the oil dry after it is used; if some months, so much the better; such varnish will set, that is to say, not run, but keep its place on the silk in four hours; the silk may then be turned and varnished on the other side.

PLIABLE VARNISH FOR UMBRELLAS, BALLOONS, &c.

Take any quantity of caoutchouc, as ten or twelve ounces, cut it into small bits with a pair of scissors, and put a strong iron ladle (such as painters, plumbers, or glaziers, melt their lead in,) over a common pit-coal fire; which must be gentle, glowing, and without smoke. When the ladle is hot, put a single bit into it; if black smoke issues, it will presently flame and disappear, or it will evaporate without flame: the ladle is then too hot. When the ladle is less hot, put in a second bit, which will produce a white smoke; this white smoke will continue during the operation, and evaporate the caoutchouc; therefore no time is to be lost, but little bits are to be put in, a few at a time, till the whole are melted; it should be continually and gently stirred with an iron or brass spoon. The instant the smoke changes from white to black, take off the ladle, or the whole will break out into a violent flame, or be spoiled, or lost. Care must be taken that no water be added, a few drops only of which, would, on account of its expansibility, make it boil over furiously and with great noise; at this period of the process, two pounds or one quart of the best drying oil are to be put into the melted caoutchouc and stirred till hot,

and the whole poured into a glazed vessel through a coarse gauze or wire sieve. When settled and clear, which will be in a few minutes, it is fit for use either hot or cold.

Observations. The silk should be always stretched horizontally, by pins or tenter hooks, on frames; (the greater they are in length the better,) and the varnish poured on *cold*, *in hot weather*, and *hot*, *in cold weather.* It is perhaps best, always to lay it on when cold. The art of laying it on properly, consists in making no intestine motion in the varnish, which would create minute bubbles, therefore brushes of every kind are improper, as each bubble breaks in drying, and forms a small hole, through which the air will transpire. This varnish is pliant, unadhesive, and unalterable by weather, whilst it is perfectly impervious to air.

VARNISH USED FOR INDIAN SHIELDS.

Shields made at Silhet, in Bengal, are noted throughout India, for the lustre and durability of the black varnish with which they are covered; Silhet shields constitute therefore no inconsiderable article of traffic, being in request among natives who carry arms and retain the ancient predeliction for the cimetar and buckler. The varnish is composed of the expressed juice of the marking nut *semecarpus anacardium*, and that of another kindred fruit, *holigara longifolia.*

The shell of the semecarpus anacardium contains between its integuments, numerous cells, filled with a black, acrid, resinous juice; which likewise is found, though less abundantly, in the wood of the tree. It

is commonly employed as an indelible ink, to mark all sorts of cotton cloth. The colour is fixed with lime. The cortical part of the fruit of holigarna longifolia likewise contains between its laminæ, numerous cells, filled with a black, thick, acrid fluid. The natives of Malabar (in which country, as well as in the eastern parts of Bengal, the tree is indigenous,) extract by incision its very acrid juice, with which they varnish targets. Both are conbined for the same purpose, by the artizans of Silhet. The juices are resinous, being soluble in alcohol and not at all so in water. They may be dissolved in fixed oils, and in diluted alkali.

To prepare the varnish according to the method practised in Silhet, the nuts of the semecarpus anacardium, and the berries of the holigarna longifolia, having been steeped for a month in clear water. are cut traversely, and pressed in a mill. The expressed juice of each is kept for several months, taking off the scum from time to time. Afterwards the liquor is decanted, and two parts of the one are added to one part of the other, to be used as varnish. Other proportions of ingredients are sometimes employed; but in all, the resinous juice of the Semecarpus predominates. The varnish is laid on like paint, and when dry is polished by rubbing it with an agate or smooth pebble. This varnish also prevents destruction of wood, &c. by the *white ant.*

FRENCH VARNISH FOR CABINETS, &c.

Take shell-lac, three parts; gum mastich, one part; gum sandarach, one part; alcohol, forty parts. The mastich and sandarach must first be dissolved in

the alcohol, and then the shell-lac: this may be done either by putting them in a bottle loosely corked, and placing it in a vessel of water, heated below the boiling point of alcohol, until the solution is effected; or by putting the ingredients into a clean Florence oil-flask, (the neck of which is partially closed by a cork, having a narrow slit along it,) it is to be heated over a spirit-lamp. The alcohol which escapes during the process must be replaced by an equal weight of it, after the operation is over; as it is desireable that the varnish should consist of the proportions given in order to be good. The solution may be poured off for use, from the impurities which remain, but it must not be filtered, as that operation would deprive the lac of some of its qualities.

Observation. In cases where a greater degree of hardness in the varnish is desireable, and its colour is but a secondary consideration, one part of shell-lac with eight parts of alcohol, is to be preferred.

COPAL VARNISH.

Reduce to powder an ounce of pure carbonate of potass, and then lay it before the fire, till it becomes hot and dry, In this state put it into a pint of alcohol, or oil of turpentine. All the watery particles contained in the oil or spirits, will be absorbed by the alkali, and the alcohol, or turpentine, will thus become pure, or highly rectified. This process is called alkalizing these solvents. Now put the turpentine or spirits into a vessel with two ounces of clear dry copal, finely pounded and sifted; place the vessel in warm water; the copal will be soon dissolved.

Observations. This varnish, which is principally applied to wood, paste-board, and prints, is to be diluted by a little warm oil of turpentine, before it is used. If the spirits of turpentine be alkalized when the copal is dissolving, a little spirits of wine should be added, and if the spirits of wine be alkalized when the copal is dissolving, a little spirits of turpentine should be added; the sediment of the varnish will dry on the silk in a few hours; the thicker the varnish, the sooner it dries.

VARNISH FOR OIL PAINTINGS.

Mix six ounces of pure mastich gum, with the same quantity of pounded glass, and introduce the compound into a bottle containing a pint of oil of turpentine; (treated with alkali as above,) now add half an ounce of camphor bruised in a mortar. When the mastich is dissolved, put in an ounce of Venice turpentine, and agitate the whole till the turpentine be perfectly dissolved.

Observations. When to be used, this varnish must be gently poured off the glass sediment at the bottom of the bottle or it may be filtered through muslin. The intention of using ground glass, is to present a greater surface of mastich, to the solvent, by throwing the particles as much apart as possible.

LACQUER OR VARNISH FOR TIN WARE.

Put three ounces of seed-lac, two drams of the substance known by the name of dragon's blood, (*sanguis draconis*) and one ounce of tumeric powder, into a pint of well rectified spirits. Let the whole remain for fourteen days, but during that time, agitate

the bottle once a day at least. When properly combined, strain the liquid through muslin.

Observation. This varnish is called a *lacquer ;* it is brushed over tin ware which is intended to imitate brass.

LACQUER FOR BRASS WORK.

Put into a pint of alcohol, an ounce of tumeric powder, two drams of arnotto, and two drams of saffron, agitate during seven days, and filter into a clean bottle. Now add three ounces of clean seed-lac, and agitate the bottle every day for fourteen days. The mixture will now be known as lacquer for brass.

Observations. When the lacquer is used, the pieces of brass, if large, are to be first warmed (so as to heat the hand) and the varnish is to be applied by a brush ; the smaller pieces may be dipped in the varnish, and then drained by holding them for a minute over the bottle. This varnish when applied to rails for desks, &c., has a most beautiful appearance, being like burnished gold.

PREPARATION OF PYROLIGNEOUS ACID.

Place a large cast-iron cylinder, or retort (similar to those used for the production of carburetted hydrogen gas,) in a furnance, so that it may receive as much heat, all round, as possible. One end of this cylinder must be so constructed as to open and shut, to admit wood and exclude the air.

Oak in pieces about a foot in length is to be put into the cylinder, which is to be filled as full as possible, without being wedged, and the door must be shut close to exclude air ; from the cylinder let a

worm run through cold water to condense the acid; by this it is conveyed to a large cask placed on one end where there is a pipe to carry it from that to two or three more; thus it is completely secured from flying off in the vaporous state. The fire is now to be raised to a great heat, sufficiently powerful to convert the wood completely into charcoal. When the acid ceases to come over, the fire is to be taken out and the mass of wood left to cool in the confined state, when it becomes perfect charcoal. In the first cask tar is chiefly contained with the acid, it precipitates to the bottom, and is drawn off by a cock; it is afterwards boiled in an iron boiler to evaporate the acid, before it is fit for use. If the acid is not strong enough, it is put into large square vats about six inches deep, for the purpose of making a large surface, to evaporate a part of the water contained in the acid more speedily by a slow heat. These vats are bedded on sand upon the top of a brick stove, where a gentle heat is applied; thus it may be procured in a pretty strong state.

Observations. At the recent anniversay of the White-haven Philosophical Society, two specimens of meat cured with the pyroligneous acid were exhibited by one of the members. They were prepared on the 7th September, 1819. One had been hung up at home, and the other had been sent out by a vessel to the West Indies, to try the effect of climate upon it, and brought back on the return of the ship to that port. They were tasted by all present, and pronounced to be perfectly sweet, fresh, and fit for use, after a lapse of fifteen months.

Besides its antiseptic use, this acid is employed

instead of acetate of lead (sugar of lead) by the calico printers, to make their acetate of alumine or iron liquor. Though it is not sufficiently pure it does well enough for blacks, browns, drabs, &c. but for yellows or reds, it is not so good, owing to the oil and tar which is in combination with it.

ENGLISH METHOD OF CURING BEEF AND PORK.

The following method was for many years successfully practised by an eminent curer of provisions in London, both for exportation and home consumption. It was communicated by this gentleman to the editor of the Commercial Magazine.

To 112 pounds (1 cwt.) of beef or pork, take ten pounds of common salt, and half a pound of saltpetre. Let the meat be well cleaned from those particles of blood which will hang about it when cut into four pound pieces; this is best done by washing it in salt and water, or any weak offal pickle, provided it be sweet. Lay the meat in rows, and rub the upper side moderately with salt, then lay another layer of meat, and repeat the operation as on the first layer; in this manner, continue the same proportion of salt and salt-petre, till you have the quantity you wish to cure, all heaped up in a tub, or some other vessel (not of lead) in order to preserve the pickle from issuing from it. In this state it must remain for three days, then turn it into another tub, sprinkling it with salt as you turn it; when all is turned, let the pickle procured by the first salting, be gently poured about the meat. In this state let it remain for a week, and it will be excellent for home use.

Should it be wanted for exportation, pack it in this

state into such casks as your order may express.—But as the greatest care for its keeping good, abroad, consists in the packing, you must first put a layer of salt in the barrel, then a layer of meat packed very close, (with your hands only) and in this manner the cask must be filled up. When headed you must carefully filter the pickle through a coarse cloth, (not boil it,) and when perfectly fine, fill up the cask by the bung hole. In this state let it remain till the next day, in order to observe whether the cask be tight or not, then bung it up. By this method I have never found myself deceived in one single instance, in its keeping any reasonable length of time. The too great rubbing of meat will not keep it the better, it frequently retards the operation of the salt by filling the outward pores of the meat only to the destruction of the middle of the piece, which frequently perishes.

Observations. Dr. Mitchell, of Philadelphia, is of opinion that when meat is salted, a decomposition takes place in the following manner, viz.: The septic acid of the meat unites with the soda of the salt, forming septate of soda, whilst the muriatic acid combines with the animal fibre, forming muriate of fibrine. Regarding the quality of the salt to be used, the following extract from a report of a committee of the House of Commons, may be worthy of attention.

"The *common* salt we are informed by an Irish member, is employed only *prior* to the packing of the beef, the *bay* salt is used *in* the packing; thus both are employed, but for different purposes, or at least in different branches of the art of salting beef.

The British salt is not used in packing the beef, because having undergone the process of boiling, *it is apt in warm countries, to melt and slip from between the interstices of the beef*, and thus fail in the object of keeping it. The Irish beef has obtained its character of keeping so well in various parts of the world, from the bay salt, with which it is cured."

Bay salt is a kind of brownish impure salt, obtained in France, Italy, and other countries, by evaporating sea water in pits. The principal part, however of the bay salt which is sold in Great Britain, is of home manufacture, being a coarse grained crystallized salt, made dirty by powdered turkey umber, or some such colouring material to imitate the foreign article. The only utility which this salt appears to possess, beyond that of the common fine grained salt universally found in the shops, is,that it dissolves more slowly by moisture, and therefore is better calculated for the salting of fish, and other animal matter, which cannot be wholly covered with brine.

Basket salt is made from the water of the salt springs in Cheshire and other places. It differs from the common brine salt in the fineness of the grain as well as on account of its whiteness, and purity. It is principally used at table. Not only is muriate of soda an agreeable and wholesome seasoning for man, but almost all herbivorous animals like it, and it appears to be very salutary for them.

Lord Somerville attributes the health of his flock of two hundred and three merino sheep, which he purchased in Spain, principally to the use which he has made of salt for the last seven years on his farm. These sheep having been accustomed to the use of

salt in their native land, his lordship considered, that in this damp climate, and in the rich land of Somersetshire, it would be absolutely necessary to supply them with it regularly. A ton of salt is used annually for every thousand sheep; a handful is put in the morning on a flat stone or slate, ten of which, set a few yards apart, are enough for one hundred sheep. Twice a week has been usually found sufficient. Of a flock of near one thousand, there were not ten old sheep that did not take readily to it, and not a single lamb which did not consume it greedily. Salt is likewise a preventative of disorders in stock fed with rank green food, as clover or turnips, and it is deemed a specific for the rot. Horses and horned cattle are also very fond of salt: the cow gives more and richer milk when salt is mixed with her food. The wild beasts of the forest, in America, at certain seasons, leave their haunts, and travel in bodies to various places where salt is to be found. These places are called *licks*, from the practice which these animals have of licking the ground on which the salt lies, or which is strongly impregnated by it.* The importance and value of salt as a corrective of food, becomes daily more evident, as its medicinal properties are rendered more fully known. Among others may be mentioned its anthelmintic properties.—Whenever salt is denied to the human being, diseases of the stomach are general, and worms are engendered in the body. In some instances, where persons from aversion to this substance, have refused

* Cattle fed on grass which grows on the sea-shore, are always fatter and in better condition than those which graze on inland pastures.

it either in food, or in any other form, worms have been engendered, and have been with great difficulty got rid of.

In Ireland, salt is a well known common remedy for bots in the horse; and among the poor people, a dose of common salt is esteemed a cure for the worms. It is supposed by some medicinal men, that salt furnishes soda to be mixed with the bile: without this necessary addition, the bile would be deprived of the qualities necessary to assist in the operation of digestion.

One of the greatest grievances of which the poor man can complain is the want of salt. Many of the insurrections and commotions among the Hindoos, have been occasioned by the cruel and unjust monopolies of certain unworthy servants of the British East India Company, who, to aggrandize their own fortunes, have oftentimes bought up, on speculation, all the salt in the different ports and markets, and thus have deprived the ingenious but wretched natives of their only remaining comfort, viz. salt; the only addition they are usually enabled to make to their poor pittance of rice! many of the poor in England have loudly lamented the high price of salt, which thousands are in the habit of using as the only sweetener of their meal of potatoes.

Salt is also of the greatest use in agriculture; from one to two bushels is about sufficient for each acre of land; but this quantity is of course to be varied according to the quality of the soil. This answers better than almost any other manure. The Chinese have for ages been accustomed to manure their fields by sprinkling them with sea water.

Salt has some other uses. The Persians sprinkle the timber of their buildings with salt, to prevent them from rotting. It is used in Abyssinia, instead of money; it passes there from hand to hand, under the shape of a brick, worth about eighteen pence. It appears very probable that the vitrified fossile pillars in which the Abyssinians enshrined the mummies of their ancestors, according to Herodotus, were nothing more than masses of *salgem*, a substance very common in that part of Africa.

Considering the many uses of muriate of soda in agriculture and the arts; and as a necessary article of food, and preservative from putrefaction; it may be pronounced one of the most generally useful and necessary to man of all the minerals; and it is truly lamentable, that in almost all ages and countries, (particularly in those where despotism has obtained a footing,) this should be one of those necessaries of life, on which the most heavy taxes are imposed.*

Muriate of *magnesia*, as well as muriate of soda, has been proved to possess most powerful antiseptic qualities, and is well known to be a constituent of sea water. It would be well worth trial by a course of experiments, to discover whether these salts separately, or conjointly, possess the property of retarding putrefaction in the greatest degree.

* It will appear rather paradoxical to many readers, to be told, that salt manufactured in England, and for which the natives pay twenty thee shillings a bushel, is, when transported across the Atlantic, sold so low as two shillings and six pence, or half a dollar per bushel, in many of the cities of the United States of America; and this too, including all the expenses of freight, land carriage, &c. The reason is, that for home consumption, the English pay a duty of seventeen shillings and six pence on every bushel they use. The duty on salt for agricultural purposes, has recently been greatly reduced.

PRESERVATION OF ANIMAL FOOD FROM PUTREFACTION, BY CHARCOAL.

Tin cannisters, (whose tops were made to slide in grooves, in the act of opening and shutting,) were filled with charcoal fumes, (carbonic acid gas,) to expel the atmospheric air. Alternate layers of charcoal and slices of meat were then put in, so that each cannister was at length quite full; one with mutton, another with beef, and a third with pork. The lids were now luted carefully, and a bladder was pasted over the top of each. The cannisters were put into a wine cellar in the month of April, where they remained until December, a period of eight months. When they were opened, the meat was found to be perfectly sweet, and of as good a colour as any at the butchers; some of the slices were dressed and eaten, and were pronounced excellent; others were kept for six days, and did not begin to putrefy until the end of that period.

Observations. There is little doubt but that meat might thus be preserved for eight years instead of eight months; and if some economical plan on the same principle, could be put in practice on shipboard, the advantages would be incalculable. Before cooking such meat, the charcoal of course is to be washed, scraped, or rubbed off.

In an account of the voyage of the French discovery ship, which sailed from Bordeaux in 1816, we find the following remarkable passage.

"On the route from the Sandwich Islands to Bordeaux, the ship only touched at the port of Canton, and at the island of Mauritius. One fact appears truly singular, viz., that of the flesh-meat substances

embarked at Bordeaux in 1816, whatever returned was in a state perfectly sound and well preserved; this arose from making use of the process of M. Balguerie, which consists in placing the meat in three successive sprinklings of salt, and afterwards in carbonised brine. Mutton dried in the oven has been well kept in pulverised charcoal."

ENGLISH METHOD OF CURING HAMS, TONGUES, &c.

We here quote the same respectable authority, as in the curing of meat by salting and the use of brine. "For pork and mutton hams, also for hung-beef, tongues, &c. use the same proportion of salt as before, but instead of half a pound, use a pound of salt-petre. Put the hams, &c. to soak all night in salt and water, in order to extract the coagulated blood and other viscid juices still retained therein. Next day, rub them gently with the salt and salt-petre; then place them in a tub, one upon another, till they are all salted; repeat the same every day for one week. By that time, they will have drawn a sufficiency of pickle to cover one half the number salted. Mix with this pickle (let us suppose drawn from twenty-four hams) one quarter of a pound of sal-ammoniac, pounded very fine, and one pound of clean muscovado sugar, well worked with a stick for a few minutes; in order to incorporate it with the pickle, pour it gently over the hams and turn them every second day for fourteen days; at the expiration of which time, take them out, wash them, hang them up in a drying house, and keep them for one week drying without smoke. Then make a fire of oak-timber, which must be covered three parts over with oak

saw-dust mixed with juniper berries, and damped with water. In this state keep them in the drying house from one to eight days. According to this method, and in the above mentioned proportions, I cure from two to three hundred hams, and great quantities of hung-beef and tongues per week, during the season, and am happy to assert, that the goods so cured, give satisfaction both at home and abroad."

Observations. As hams, beef, and tongues, hung up only the time above mentioned, are not dry enough for use, they must then be hung up in a room moderately warm, and in a current of air; and when perfectly dry, pack them up in a box or cask in the following manner. A layer of hams and a layer of malt dust about three inches thick, till you have packed all. Let them remain in it; this will prevent the small *hopper-fly* during the summer season, and will, in the course of six weeks, produce a fermentation which will make the hams completely hot, so that the fat becomes transparent. As soon as this is found to be the case, take them out of the package, put them in bags, and hang them up for use; they will then have that flavour which is peculiar to the best hams.

Hams, and all other dry provisions eat better after a voyage to the West Indies, than they do here, merely on account of the fermentation they undergo by a long voyage. This fermentation extracts those superfluous particles of salt which they imbibe in the curing, makes the meat eat *shorter* and gives it that flavour which many ham-eaters so much admire.

ERRATA.

Page 58—line 22—for	*tob*	read,	*top.*
67—line 26—for	*spirit*		*sugar.*
111—line 24—for	*precipite*		*precipitate.*
121—line 13—for	*strained*		*stirred.*